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THE AGRICULTURAL GAZETTE OF CANADA

STORAGE

Vol. X September-October, 1923 No. 5

LEADING TOPICS

The Canadian Dairy Industry
Agricultural Legislation, 1923, Dominion and Provincial
The Dominion Experimental Stations at Scott, Saskatchewan and Lacombe, Alberta
Seed Grain Competitions, Quebec
Live Stock Outlook in Saskatchewan
Grasshopper Control in Alberta
The New Brunswick Agricultural Societies
High School Agriculture, Alberta
World's Wheat Situation

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OTTAWA, CANADA

The Agricultural Gazette of Canada is published bi-monthly, in English and in French, by the Dominion Department of Agriculture, Ottawa.

The aim of The Agricultural Gazette is to provide a source of information as to the policies and activities of the Dominion Department of Agriculture and of the Provincial Departments of Agriculture and of Education, so far as the work of the latter relates to Agricultural Education. Besides being a publicity medium, it constitutes a comprehensive record of the progress and development of departmental effort on behalf of Agriculture in Canada.

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DEPARTMENT OF AGRICULTURE
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The AGRICULTURAL GAZETTE
OF CANADA

J. B. SPENCER, Director of Publicity
Wm. B. VARLEY, Editor

Issued by authority of the Honourable W. R. Motherwell, Minister of Agriculture
OTTAWA

MAP OF CANADA SHOWING THE LOCATION OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS.

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The AGRICULTURAL GAZETTE
OF CANADA

VOL. X SEPTEMBER-OCTOBER, 1923 No. 5

A REVIEW OF THE CANADIAN DAIRY INDUSTRY

General Survey

DAIRYING, one of the most important of Canadian agricultural industries as well as one of the oldest, began its development in its modern form with the introduction of the centralized or factory system of making cheese and butter, the centrifugal cream separator, and improved cold storage facilities. The first Canadian cheese factory was established in the province of Ontario in 1864, the first butter factory, in the province of Quebec, in 1873. The year 1882 witnessed the introduction of the first cream separator from Denmark, while the government organization of cold storage services dates from 1895. The factory system, a semi-co-operative plan for the manufacture of milk, immediately became popular, and for many years practically all the cheese has been manufactured on this plan. While the output of butter factories or creameries is great and is continually increasing, 68 per cent of the total quantity of butter produced was, according to the Census of 1911, made on the farms, either for home consumption or for near-by markets.

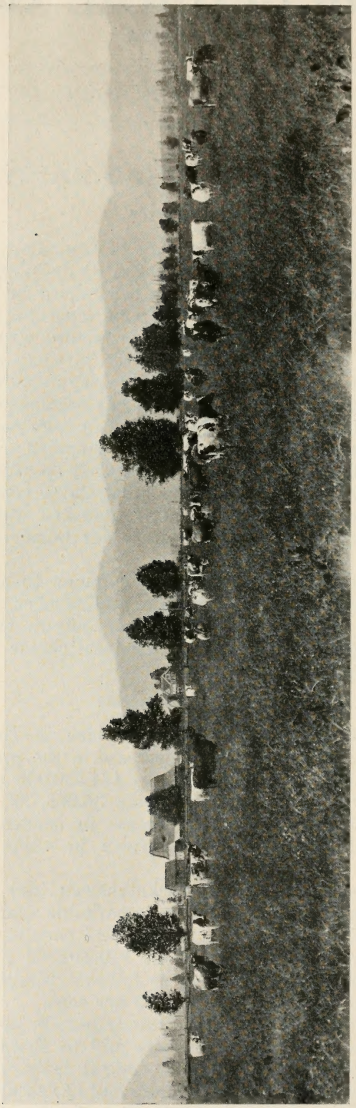
The factory system of manufacture is common to all the provinces of Canada, but the older provinces, Ontario and Quebec, with their greater population, lead all others in the volume of output, these two provinces producing approximately 97 per cent of the total cheese and 68 per cent of the total creamery butter.

Recent Developments

Three important changes have taken place in the Canadian dairy industry of recent years. These are a decrease in the production of factory cheese from 220,833,269 pounds in 1900 to 134,530,053 pounds in 1922, an increase in creamery butter production from 36,066,739 pounds in 1900 to 146,863,517 pounds in 1922, and an increase in condensed milk products, which in the period, 1900-1922, have grown in value from $269,520 to $6,839,232.

In the provinces of Manitoba, Saskatchewan and Alberta the dairy industry has developed since 1910 in a remarkable manner, the output of creamery butter having increased from 4,161,947 pounds, valued at $459,254 in 1910, to 28,619,641 pounds, valued at $10,348,762 in 1921. A further increase in 1922 over 1921 is recorded, as follows: Manitoba, 23·5 per cent, Saskatchewan, 25 per cent, and Alberta, 20 per cent.

During this period, these provinces, from importers have become exporters of butter to the Eastern Canada markets and to British Columbia. The quality of the product due to efficient control is at least equal to that produced in any other part of the Dominion, and has secured a good reception in the British market in competition with that of other countries.



Dairy Farm and Ayrshire Herd at Sardis, British Columbia.

Increased production has coincided with the number of cows kept, and with the establishment of creameries. The number of cows in the three provinces in 1910 was 427,671, compared with 1,100,288 in 1922, and creameries are now accessible generally.

In Canadian factories the cheese manufactured is mostly of the Cheddar type. Genuine Stilton is turned out on the Dominion Experimental Farm at Agassiz, B.C., and a soft cheese, known as Meilleur, has been originated at the Central Experimental Farm, Ottawa. The Trappist monks at the Oka Agricultural Institute in Quebec make what is known as Oka cheese. Cottage cheese is made to a limited extent on the farm from sour skim-milk without the aid of rennet.

OUTPUT AND VALUE

An estimate of the total value of the dairy products of Canada, made for the year 1921 by the Dominion Dairy Commissioner and the Dominion Bureau of Statistics, placed it at $212,896,350. The details as to quantities and values are as follows:—

DAIRY PRODUCTION, 1921

Product		Quantity	Value
Cheese	Lbs.	162,117,494	$ 28,710,030
Creamery butter	"	128,744,610	48,135,439
Farm butter	"	125,000,000	37,500,000
Whey butter	"	1,337,404	431,114
Condensed milk	"	38,997,936	5,837,787
Condensed skim-milk	"	1,307,781	51,788
Evaporated milk	"	51,202,713	3,428,456
Condensed coffee and cocoa	"	324,011	94,065
Milk powder	"	1,703,496	554,918
Skim-milk powder	"	5,749,229	830,585
Sterilized milk	"	6,696,264	719,009
Casein	"	98,136	9,814
Ice cream	Gals.	5,736,702	8,287,000
Cream sold by dairy factories	Lbs. B. fat	8,051,215	5,734,638
Buttermilk sold			300,278
Milk for direct consumption			72,000,000
Curd, cheese, whey, whey cream, skim-milk			271,429
Total value			$212,896,350

In the foregoing statement the quantity of butter produced on farms, and designated "Farm Butter," is estimated.

The total value of the products of Canadian dairy factories, omitting farm-made butter, etc., for the years 1911, 1917, 1920, 1921, follows:—

VALUE OF ALL DAIRY FACTORY PRODUCTS, 1911-21

1911	$ 39,047,840
1917	93,879,326
1920	146,336,491
1921	111,924,017

Creamery Butter

The total quantity of creamery butter produced in Canada in 1922 was 146,863,517 pounds (preliminary figures) compared with 128,744,610 in 1921. The production of creamery butter has increased about two and a half times during the last twelve years in Ontario and Quebec. In the Western Provinces, the production, while relatively small, has increased at an even greater ratio.

QUANTITY AND VALUE OF CREAMERY BUTTER, BY PROVINCES, 1920, 1921 AND 1922

Province	1920		1921		1922
	Quantity	Value	Quantity	Value	Quantity
	lbs.	$	lbs.	$	lbs.
Prince Edward Island	1,166,032	674,744	1,109,546	452,523	1,274,622
Nova Scotia	2,503,188	1,518,757	3,094,768	1,306,465	3,296,566
New Brunswick	1,053,649	606,891	1,152,168	4,5,112	1,218,969
Quebec	41,632,511	23,580,949	48,478,403	17,594,921	52,529,344
Ontario	37,234,998	21,343,858	4.,471,532	16,680,247	51,000,000
Manitoba	7,578,549	4,282,731	8,541,095	3,255,057	10,559,601
Saskatchewan	6,658,656	3,727,140	7,030,053	2,552,698	8,891,450
Alberta	11,821,291	6,555,509	13,048,493	4,543,007	15,175,300
British Columbia	2,062,844	1,334,624	2,818,552	1,277,409	2,917,665
Totals	111,691,718	63,625,203	128,744,610	48,135,439	146,863,517

Cheese

The quantity of cheese made on the farms is negligible. The total quantity of factory cheese produced in 1922 was 134,530,053 pounds (preliminary figures). These figures show a decrease of 27,587,441 pounds over 1921. Five provinces showed an increase and four a decrease. The increases were as follows: Prince Edward Island, 484,189 pounds; Nova Scotia, 2,420 pounds; Quebec, 3,106,707 pounds; Alberta, 547,346 pounds; and British Columbia, 21,840 pounds. The decreases were: New Brunswick, 181,866 pounds; Ontario, 6,759,066 pounds; Manitoba, 30,829 pounds; and Saskatchewan, 2,659 pounds.

The following table shows, by provinces, the production and value of factory cheese for the years 1920 and 1921, and the production for 1922.

QUANTITY AND VALUE OF FACTORY CHEESE, BY PROVINCES, 1920, 1921 AND 1922

Province	1920		1921		1922
	Quantity	Value	Quantity	Value	Quantity
	lbs.	$	lbs.	$	lbs.
Prince Edward Island	2,081,277	525,635	1,681,779	293,651	1,742,242
Nova Scotia	52,638	14,865	29,440	5,578	31,860
New Brunswick	1,235,008	336,409	1,100,382	203,941	918,496
Quebec	52,162,777	13,372,250	54,242,735	9,197,911	39,679,901
Ontario	92,784,757	24,605,823	103,432,696	18,676,380	90,500,000
Manitoba	116,229	31,611	255,829	47,341	225,000
Saskatchewan	28,367	7,790	22,659	4,209	20,000
Alberta	398,750	110,355	930,660	200,478	975,000
British Columbia	342,053	96,134	421,314	80,541	437,554
Totals	149,201,856	39,100,872	162,117,494	28,710,030	134,530,053

Condensed Products

During the last twenty years the manufacture of condensed and dried milk has become well established, particularly in Western Ontario, while the manufacture of ice cream is now an important industry in all parts of Canada.

The first milk-condensing plant was established in Truro, Nova Scotia, in 1883. There are in Canada at the present time, 23 plants engaged in the manufacture of condensed or evaporated products, including milk powder and sterilized milk. The output of these products was valued in 1900 at $269,520, in 1921 at $11,526,422, and in 1922 at $6,839,232.

Powdered Milk

The manufacture in Canada of milk powder by modern spray processes dates from 1909, although the hot roller process was in operation commercially several years earlier. At the present time there are ten produc-

ing plants engaged for the most part in the manufacture of skim-milk powder. Other kinds of powder are, however, manufactured to a considerable extent, including whole milk and cream powders, as well as modified milk powder, protein milk powder, and ice cream powder. It is estimated that, in 1923, upwards of 100,000,000 pounds of milk will be marketed in the form of powders of various kinds.

The following tables give the production and value of condensed and miscellaneous dairy products for the years 1920 and 1921:—

CONDENSED PRODUCTS, 1920 AND 1921

Product	1920		1921	
	Quantity	Value	Quantity	Value
	lbs.	$	lbs.	$
Condensed milk	53,662,699	10,202,230	38,997,936	5,837,787
Condensed skim-milk	363,294	18,723	1,307,781	51,788
Evaporated milk	30,469,642	3,809,653	31,202,713	3,428,456
Milk powder	7,574,668	2,178,176	1,703,496	554,918
Skim-milk powder	.....	.....	5,749,229	830,585
Sterilized milk	7,608,927	785,044	6,696,264	719,009
Condensed coffee and cocoa	531,451	147,052	324,011	94,065
Casein	109,958	19,233	98,136	9,814
Totals	.....	17,160,111	.....	11,526,422

MISCELLANEOUS PRODUCTS, 1920 AND 1921

Product	1920		1921	
	Quantity	Value	Quantity	Value
	lbs.	$	lbs.	$
Whey butter	1,516,932	757,156	1,337,404	431,114
Ice cream	2,996,514	4,151,949	3,007,337	3,967,918
Milk sold	28,199,796	14,249,858	27,003,785	12,846,749
Cream sold (lb. butter fat)	7,379,131	6,533,098	8,051,215	5,734,638
Buttermilk sold	.....	306,235	.....	300,278
Sundry	.....	452,009	.....	271,429
Totals	.....	26,450,305	.....	23,552,126

Increase in Production

That the volume of production of the dairy industry in Canada is steadily increasing, is indicated by the following statement of the annual factory output over a period of years:

CREAMERY BUTTER PRODUCTION
Quantity

	Pounds
1911	64,698,165
1916	82,564,130
1920	111,691,718
1921	128,744,610
1922	146,863,517

FACTORY CHEESE PRODUCTION
Quantity

	Pounds
1911	199,904,205
1916	192,968,597
1920	149,201,856
1921	162,117,494
1922	134,530,053

The diversion of milk from cheese factories to condensed milk and milk powder factories and increased demand from growing urban population for milk, cream, butter, and ice cream, have resulted in the cheese output declining or remaining stationary.

MISCELLANEOUS PRODUCTS
Value
CONDENSED AND EVAPORATED MILK, CREAM, ICE CREAM, AND WHOLE MILK, ETC.

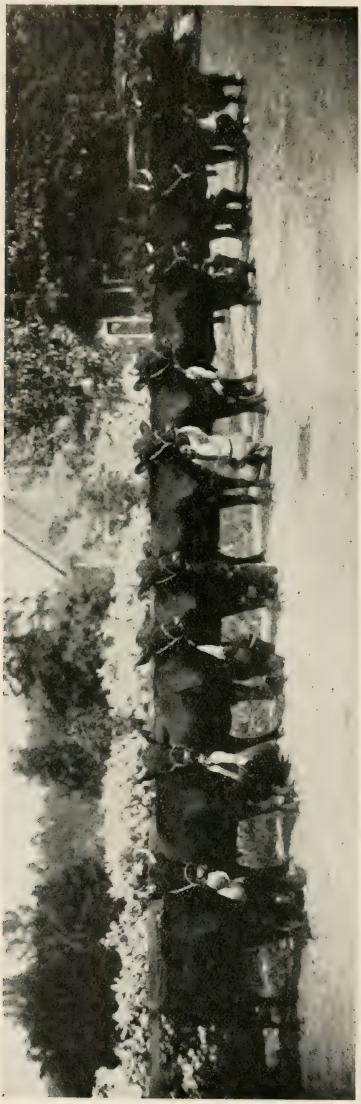
1911	$ 1,814,871
1917	18,424,485
1920	43,610,416
1921	35,699,581

Further evidence of increased production is found in the number of dairy cows kept on Canadian farms:

NUMBER OF DAIRY COWS

1911	2,595,255
1916	2,835,532
1920	3,530,238
1921	3,736,832

It is estimated that the average yield of milk per year of milk cows in the Dominion is about 4,000 pounds.



The "Canadian" Cow.—a breed originated in Canada. The herd at the Oka Agricultural Institute, La Trappe, Quebec.

DOMESTIC CONSUMPTION
AVERAGE PER CAPITA CONSUMPTION OF DAIRY PRODUCTS IN CANADA, THE UNITED STATES AND THE UNITED KINGDOM

Country	Year	Milk	Butter	Cheese
		gallons	lbs.	lbs.
Canada	1916	26·0	27·7 (1911)	3·0 (1911)
United States	1920	43·0	15·5 (1919)	4·2 (1919)
United Kingdom	1914	22·2	17·0 (1914)	11·2 (1905)

MANUFACTURE—CHARACTER OF DAIRY FACTORY ORGANIZATION

Of the total factories in operation in 1921, 2,177 were operated by individuals and partnerships, 478 by incorporated companies and 459 by co-operative associations.

The classification as to the number of days operated in the year is as follows:—

Number of factories operating for 240 days and over	817
Number operating for 180 to 239 days	1,154
Number operating for 120 to 179 days	1,046
Number operating for less time	97

Capital Employed in Dairy Factories

The total amount of capital employed by dairy factories in 1921 was $35,257,831, the following being the allocation:—

Land and buildings	$ 13,655,472
Machinery and equipment	13,096,066
Products on hand	4,012,059
Cash and operating accounts	4,494,234
Total	$ 35,257,831

Number of Dairy Factories and Patrons

In 1921 there were 3,114 dairy factories in operation. Of these, 1,092 were creameries, 1,619 cheese factories, 376 combined butter and cheese factories, and 27 were condenseries. While the total number of factories showed a decrease as compared with 1919 and 1920, the number of farmers supplying milk and cream increased, being 312,369 in 1921 compared with 276,693 in 1920 and 275,060 in 1919.

NUMBER OF ESTABLISHMENTS AND AMOUNT INVESTED IN DAIRY FACTORIES, BY PROVINCES, 1921

Provinces	Establishments	Capital Invested
	No.	$
Prince Edward Island	34	167,381
Nova Scotia	24	436,636
New Brunswick	38	302,922
Quebec	1,766	7,048,603
Ontario	1,062	18,191,626
Manitoba	51	2,338,647
Saskatchewan	56	2,592,319
Alberta	50	2,536,781
British Columbia	28	1,077,150
Total	3,114	55,257,831

Milk and Cream Delivered and Amount Paid Patrons

The quantity of milk delivered to factories in 1921 was 2,965,222,121 pounds, and the quantity of cream was 88,263,208 pounds (butter fat content), increases being shown in both products over the previous year. The amount paid to patrons for milk and cream in 1921 was $81,422,226. The average price for milk was $1.57 per 100 pounds, and the average price for cream per pound (butter fat content) was 39 cents.

Number of Cows

The number of cows supplying milk to factories was 1,851,199 in 1921, compared with 1,718,999 in 1920.

MARKETS AND MARKETING—EXPORTS AND IMPORTS

The United Kingdom is Canada's chief export market for dairy products. It may be said indeed to be the only export market of primary importance. Canada's cheese has long held, and continues to hold, a premier position in that market. As regards butter, the export surplus is too irregular at present to establish its position securely, although prospects for expansion are distinctly encouraging.

The exports of all dairy products show an increase in volume during the last ten years, except cheese, which slightly decreased. The most important increase has been in condensed and preserved milk, and, more recently, in the butter exports.

In the butter-making industry, the present rate of increase in exports (3,142,682 pounds in 1911 and 21,994,578 pounds in 1923) is expected to be maintained, in view of the establishment of government grading, the organization of the business in Western Canada and the possibilities for extension existing in that part of the country and elsewhere.

Cheese

Of the cheese exported, practically the whole finds its way to the United Kingdom, where it is well known to the British consumer. The export business in cheese grew rapidly from 1870 to 1900. In later years the increase has not been so marked on account of increased domestic demand for dairy products.

CHEESE EXPORTS AND IMPORTS, CANADA .1911-23

Exports			Imports		
Year	Quantity	Value	Year	Quantity	Value
	lbs.	$		lbs.	$
1911	181,895,724	20,739,507	1911	866,653	171,269
1916	168,961,583	26,690,500	1916	971,821	187,873
1920	126,395,777	36,336,863	1920	362,693	206,500
1921	133,620,300	37,146,722	1921	551,040	253,647
1922	133,849,800	25,440,322	1922	877,357	325,297
1923	114,548,900	20,828,234	1923	916,517	327,022

Butter

Butter is exported to various countries; the excess of exports over imports has become great only during the last fiscal year. In the fiscal year of 1922-23 the total amount exported was 21,994,578 pounds, the excess of exports over imports being 18,227,005 pounds. The destination of the exports was varied, 17,527,607 pounds going to the United Kingdom; 2,423,086 pounds to the United States; and various small amounts to Belgium, Bermuda, British Guiana, British West Indies, China, Cuba, Newfoundland and other countries.

The butter exports and imports of recent years are as follows;—

BUTTER EXPORTS AND IMPORTS, CANADA, 1911-23

Exports			Imports		
Year	Quantity	Value	Year	Quantity	Value
	lbs.	$		lbs.	$
1911	3,142,682	744,288	1911	1,227,390	296,303
1916	3,441,183	1,018,769	1916	4,309,831	1,092,800
1920	17,612,605	9,844,359	1920	397,955	176,994
1921	9,739,414	5,128,831	1921	3,741,628	1,805,709
1922	8,430,591	3,224,390	1922	6,078,882	1,883,013
1923	21,994,578	8,243,138	1923	3,767,573	1,349,819

Other Products

Condensed and preserved milk was exported in 1923 principally to the United Kingdom (9,949,600 pounds); United States (5,822,600 pounds); British West Indies (1,756,300 pounds); Belgium (148,200 pounds); Cuba (1,515,700 pounds); Netherlands (4,126,000 pounds); Newfoundland (546,800 pounds); Germany (388,900 pounds); and to numerous other countries in various small amounts.

Exports of milk powder, fiscal year 1923, total 3,927,952 pounds; to United Kingdom 1,229,888 pounds; to United States 1,475,816 pounds; to Germany 1,136,238 pounds.

EXPORTS AND IMPORTS OF MILK AND MILK PRODUCTS, 1916-23

		Imports		Exports	
	Year	Quantity	Value $	Quantity gals.	Value $
Cream	1916			1,262,280	1,131,832
	1920			795,780	1,122,424
	1921			1,279,195	1,987,461
	1922			1,671,678	2,479,080
	1923			1,712,241	2,793,937
Milk, fresh	1916			394,831	59,028
	1920			1,985,113	576,666
	1921			1,508,618	412,916
	1922			1,391,299	311,922
	1923			856,039	189,301
Milk and Cream, fresh	1916		13,914		
	1920		18,652		
	1921		45,973		
	1922		33,055		
	1923		28,274		
				lbs.	
Milk powder (formerly included in next following item)	1922			909,208	204,090
	1923			3,927,952	383,855
Milk, condensed, canned or preserved		lbs.			
(includes milk powder prior to 1922)	1916	53,258	3,987	13,247,800	770,566
	1920	75,652	10,730	54,247,500	8,517,771
	1921	131,026	21,215	49,147,500	8,187,937
	1922	164,654	27,219	33,133,500	4,881,020
	1923	209,606	46,487	26,381,200	2,861,058
Casein	1916		24,372	50,564	3,282
	1920	1,234,635	159,177		
	1921	1,04.,713	129,017		
	1922	217,613	19,689	2..,615	1,413
	1923	643,347	92,710	20,060	1,281

Export Facilities

The butter and cheese destined for overseas markets is exported chiefly through the port of Montreal during the season that navigation is open, and, during the winter months, from St. John, N.B. A new and completely equipped cold storage warehouse of large capacity has recently been erected at Montreal by the Harbour Board. The plant is located on the harbour front and is accessible by all the railways entering Montreal.

Most of the steamers in the regular trade with the United Kingdom are now equipped with cold storage facilities.

Oleomargarine and Renovated Butter Prohibited

In 1917, the entry of oleomargarine and its manufacture and sale in Canada was permitted as a war measure. By a recent decision of Parliament, its import and manufacture after September 1, 1923, and its sale after March 1, 1924, was again prohibited. The importation, manufacture and sale of renovated butter and of "filled" milk or cream (that is milk or cream containing fat other than that of milk) is prohibited.

Jersey Cows in Pasture. Comox District, British Columbia.

Exports via Montreal

The total exports of butter and cheese from Montreal for the years 1910 to 1922, inclusive, were as follows:—

	Cheese boxes	Butter pkgs. (Average of 56 lbs.)
1910	1,892,235	27,884
1915	1,851,731	54,495
1920	1,407,548	10,357
1921	1,441,779	70,369
1922	1,166,147	318,144

GOVERNMENT REGULATION AND SUPERVISION

Government regulation and supervision of the dairy industry and its development, from the Federal point of view, is in the hands of the Dairy and Cold Storage Branch of the Dominion Department of Agriculture, Ottawa, with a commissioner at its head, who administers all Federal dairy enactments. The grading of dairy produce is under the control of this Branch. Among its other important functions are: (1) Cargo inspection both at Canadian ports and in the United Kingdom. By means of this service defects in handling, packing and shipping, and temperatures during transit are reported. (2) The inspection of public cold storage warehouses; (3) The granting of subsidies to cold storages; (4) The issuing of market reports; (5) The encouragement of cow testing by owners of dairy herds; (6) The conducting of educational Butter and Cheese Scoring Contests, under which samples of the output from all parts of Canada are scored and reported upon to the makers, with a view to establishing a uniformly high standard, and (7) the operating of a model demonstration factory. The education of the public as to the nutritive value of milk and milk products, particularly in the diet of the young, has recently been undertaken by the Branch.

Under government auspices associations have been very generally established in all the provinces for testing the production of individual cows in the dairy herd. A progressive increase in milk and fat production has followed, as the following figures indicate:—

Average Production in Tested Dairy Herds	1915	1919	1921
Average production, milk; lbs.	5,285	5,522	5,801
Average production, fat, lbs.	195·5	207·9	214·1

The number of cows under test was 1919, 22,517; 1920, 33,382; 1921, 47,895 (exclusive of Saskatchewan).

The work of the dairy schools of the different provinces and the employment of inspector-instructors who visit the factories from time to time, have resulted in greater uniformity in the quality and character of the cheese and creamery butter produced in widely separated parts of the country, while the various activities of the Dominion Department of Agriculture in disseminating dairy information, in correlating the provincial educational work, in providing refrigerator car services, and encouraging the insulation of cold storage space on transatlantic steamers, have helped materially to place Canadian dairy produce on the markets of the United Kingdom and other countries in the best possible condition.

Dairy Produce Grading

The government grading of all creamery butter and factory cheese intended for export, according to established standards, was inaugurated on April 1, 1923. Previous to that time, export cheese, sold by auction at Montreal, had been graded, while several of the provinces had, for a number of years, undertaken more or less educational grading both of cheese and butter. With the grading

and classification of all export dairy products, buyers abroad may absolutely rely on these products conforming to standard.

The government grading of cream at the creamery was recently instituted, under provincial auspices, in each of three Prairie Provinces, Manitoba, Saskatchewan and Alberta, and also in Nova Scotia. The extension of this system to other provinces is looked for.

Inspection of Condensed Products

Establishments in which milk is condensed, evaporated or otherwise preserved for food for export, either out of Canada or out of any province to any other province thereof, are inspected under the Meat and Canned Foods Act by officers of the Dominion Department of Agriculture. Regulations thereunder provide that the materials used shall be sound and wholesome, that containers shall be properly sterilized, that no deleterious drug, dye or preservative may be used, and that the label shall show the name and address of the manufacturer and give a true description of the contents.

Dominion Experimental Farms

The work of the Dominion Experimental Farm System in relation to dairy husbandry is both extensive and varied. Comparisons are conducted in the grading up of dairy herds, and feeding studies are carried on. These investigations extend to many of the branch farms in all sections of the Dominion. Several different kinds of cheese are manufactured, including a soft cheese known as Meilleur, which was originated at the Central Farm, Ottawa.

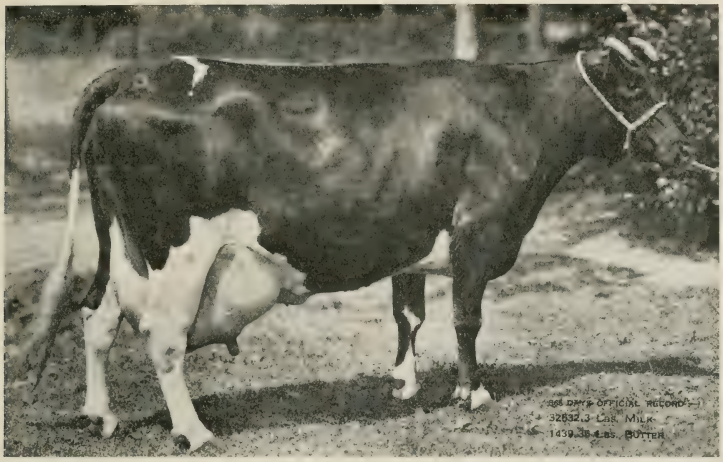
The following is a list of the Farms and Stations belonging to the Dominion Experimental Farms System which maintain pure-bred herds of dairy cattle, together with the name of the breed:—

Province	Station	Breed
Prince Edward Island	Charlottetown	Ayrshire
Nova Scotia	Kentville	Shorthorn
	Nappan	Guernsey
New Brunswick	Fredericton	Holstein, Ayrshire
Quebec	Lennoxville	Ayrshire, Jersey, Shorth on
	Cap Rouge	French-Canadian
	Ste Anne de la Pocatière	Ayrshire
	La Ferme	Ayrshire
Ontario	Cental Experimental Farm, Ottawa	Ayrshire, Holstein, Jersey, French-Canadian
	Kapuskasing	Ayrshire, Shorthorn
Manitoba	Brandon	Shorthorn (Dual-purpose)
	Morden	Ayrshire
Saskatchewan	Indian Head	Shorthorn
	Scott	Shorthorn
	Rosthern	Holstein
	Swift Current	Shorthorn
Alberta	Lacombe	Holstein, Aberdeen-Angus
British Columbia	Agassiz	Holstein
	Sidney	Jersey
	Invermere	Ayrshire

Tuberculosis Control

Regulations under the Animals Contagious Diseases Act provide for the inspection and testing of pure bred herds for bovine tuberculosis by the Veterinary Director General, and the accrediting of such herds.

Imported animals are subjected to the tuberculin test before admission to Canada, unless coming from accredited herds in the United States,



The present holder of the world's record for milk and butter-fat production: De Kol Plus Segis Dixie, 25787. Owned by Donat Raymond, Vaudreuil, Que. Bred in Canada.

The previous world record holder: the Holstein-Friesian Cow, Agassiz Segis May Echo, owned by the Dominion Experimental Farm, Agassiz, B.C. Bred in Canada.

with which country a reciprocal arrangement exists.

The Dominion Municipal Tuberculosis Order, 1917, is designed to assist cities and towns to secure a tuberculosis free milk supply. Provision is made for the classification of dairy herds into Class "A" herds, which are tuberculosis free, and Class "B" herds, from which the milk must be pasteurized.

Record of Performance

The production of pure bred dairy cows is ascertained by a systematic weighing and testing of the milk, carried on according to the requirements of the Canadian Record of Performance. Cows that reach the production standard required by the associations representing the different breeds are granted certificates. This leads to the elimination of low producers, and to breeding only from high producing strains.

The Canadian record of performance for pure-bred dairy cows shows that the number of certificates issued to cows that had qualified up to April 1, 1923, was 8,029. According to breeds, the numbers were as follows: Holstein-Friesian, 3,227; Ayrshire, 2,541; Jersey, 1,316; Shorthorn, 653; Guernsey, 145; French Canadian, 135; Red Polled, 12.

World Records Held by Canadian Cows

The World's Record for the highest amount of butter fat produced in 365 days was obtained by "Bella Pontiac" in 1920-21, a Canadian bred cow owned by Thomas A. Barron, Brantford, Ontario. Her production was 27,191 pounds of milk and 1,270 pounds of fat.

In 1921-22, the world's record was secured by "Agassiz Segis May Echo," another Holstein-Freisian cow, bred and owned in Canada, the property of the Dominion Experimental Farm at Agassiz, British Columbia, with a record of 30,886 pounds of milk and 1,345 pounds of butter fat.

Again, in 1923, the world's record for butter fat production was broken and is at present held by a Canadian bred cow. This is "Dekol Plus Segis Dixie," owned by D. Raymond, Vaudreuil, Quebec. This cow, freshening at the age of nine years and three months, produced, under official test, 33,477·3 pounds of milk, containing 1,686·5 pounds of butter in 365 consecutive days, this being the second time that she has been the title holder.

The world's championship for grade cows is also claimed for the Holstein-Freisian cow, "Dairy Maid," the property of Alex Davie, of Ladner, B.C., with a record of 22,514 pounds of milk and 1,132·06 pounds of butter in 365 days.

The statistics as to production and values quoted in this article were compiled by the Dominion Bureau of Statistics.

AGRICULTURAL LEGISLATION AND APPROPRIATIONS, 1923

DOMINION OF CANADA

An Act to Amend and Consolidate the Acts respecting Live Stock.—A consolidation of the original Act and amendments with certain additions. The act provides for the control of stock yards and stock exchanges associated therewith; for the inspection of animals prior to slaughter, and for establishment of egg-breaking plants. The act authorizes the control by regulation of the grading of hogs and other live stock at stock yards and abattoirs, and the grading of eggs and wool. The act controls also the manner in which meat, live stock, poultry, eggs, and wool imported into Canada shall be inspected, graded, branded, and put on the market. A new feature provides for the organization of export cattle associations.

An Act to amend the Animal Contagious Diseases Act.—The amendment provides that the maximum amount that may be paid in compensation for pure bred cattle slaughtered under the act shall be $150. No change was made with respect to the rate for grade animals. The act came into force on July 1, 1923.

An Act to amend the Dairy Industry Act, 1914.—The Dairy Industry Act, 1914, was so amended as to establish a minimum standard of eighty per cent fat in butter; to prohibit the manufacture, importation and sale of milk or cream containing any fat or oil other than that of milk; to provide by regulation that records be kept, available to inspectors, by manufacturers and dealers in butter and cheese, for the registration of cheese factories and creameries, and by assigning to each a number, which shall appear on the product itself or on the package containing goods of each respective factory.

The section dealing with fat in milk and cream does not come into effect until the first day of October, 1923.

Oleomargarine.—The Act permitting oleomargarine becomes ineffective as to importation and manufacture after August 31, 1923, and the sale of oleomargarine will cease on the last day of February, 1924.

An Act to regulate the Sale and Inspection of Fruit and Fruit Containers—This Act, known as the Fruit Act, supersedes The Fruit Marks Act, 1901, and subsequent amendments thereto. The measure makes provision for new grade names for apples, crabapples and pears packed in boxes, and defines the capacity measurements of packages for apples, pears, cherries, plums, and berries. In the grading of apples, the terms No. 1, No. 2, Domestic and No. 3 as applied to apples, crabapples and pears packed in boxes, have been superseded by the designations "Extra Fancy," "Fancy" and "C Grade". In apples packed in barrels, the "Domestic" grade has been changed to increase the percentage free from worm holes from 80 to 90.

The Act provides for the use of a half barrel to be exactly one-half the size of the present standard apple and pear barrel, and prescribes definite dimensions for packages for plums, prunes, cherries, berries or currants to conform to the United States legal packages, as follows:—

All cherry boxes manufactured in Canada, and all boxes containing cherries packed in Canada for sale, must have a capacity measurement of (1) 729 cubic inches and (2) 364½ cubic inches, and must measure, inside, 18 inches by 9 inches by 4½ inches (containing 20 pounds net)

and 18 inches by 9 inches by $2\frac{1}{4}$ inches (containing 10 pounds net), respectively. The new standard plum or prune box will have a capacity measurement of $672\frac{3}{4}$ cubic inches and will measure inside 18 inches by $11\frac{1}{2}$ inches by $3\frac{1}{4}$ inches.

After the first day of October, 1924, all berry and currant boxes must contain $67\frac{1}{5}$ cubic inches (American quart), or $33\frac{3}{5}$ cubic inches (American pint), instead of $\frac{4}{5}$ quart, one pint and $\frac{2}{5}$ quart as formerly. The new sizes will be standard in Canada from the date of the passing of the Act.

Further provisions require that fruit packed in open packages, bearing any of the grade marks specified in the Act, must comply with the grade requirements as defined therein. Also that the marks on boxes containing apples, pears and peaches shall include the number of specimens in each box. It is made an offence to handle fruit roughly in process of picking and packing.

A definition of the term "properly packed" has been included in the Act. Also where the words "slightly affected" are used in the definition of the Domestic grade, this is now specifically defined to mean "not over five per cent scab and five per cent other defects on each specimen, but in the aggregate not to exceed seven per cent of the surface of the fruit."

Sections 18 and 19 of the amended Act are designed to protect growers, shippers and shipping organizations, by providing a penalty for the unlawful use of a registered number or mark on open packages, and also for the use, by a person not entitled to it, of any brand belonging to a grower or shipper.

While the Act gives the capacity measurement of the various standard packages, the Minister of Agriculture, with the approval of the Governor in Council, may make regulations to prescribe the quality, form and dimensions of such containers; and, in addition, may authorize the manufacture and use under permit of twelve quart baskets for the bulk shipment of grapes. The Governor in Council may also by regulation prescribe packages containing imported fruit and the brands or marks to be used thereon.

An important clause provides that an inspection certificate, signed by an official inspector appointed under The Fruit Act, shall be *prima facie* evidence of the grade and condition of the fruit or packages to which the said certificate may refer.

In addition to the above, numerous other changes and amendments have been made which will be of material assistance in the development of the fruit industry in Canada.

An Act to amend the Root Vegetables Act.—A section is added to The Root Vegetables Act, providing that an inspection certificate, signed by an official inspector appointed under the act, shall be *prima facie* evidence of the grade and condition of the root vegetables or packages to which said certificate may refer.

An Act respecting the Testing, Inspection and Sale of Seeds.—"The Seeds Act, 1923," replaces the Seed Control Act, 1911. The new Act retains the desirable features of the old Act and, in addition, enlarges the scope so as to include as stringent provisions as are contained in the seed laws of countries trading with Canada.

The original Act provided for the compulsory grading only of timothy, alsike, red clover, and alfalfa seeds. The new Act provides for the selling under grade only of all kinds of grass and clover seeds, flax, sorghum, millet, wheat, oats, barley, rye, corn, buckwheat, sunflower, field peas, field beans, and vetches. The grades are Registered, Extra No. 1, No. 1,

No. 2 and No. 3. Each grade represents definite standards of freedom from weeds and quality, while Registered and Extra No. 1 grades carry a guarantee as to purity of variety. Seed that will not grade at least No. 3 or No. 3 mixture is marked "Rejected" and prohibited from sale until recleaned to come within the standard grades.

Provision is made for the selling of field root and garden seeds, either under grade or labelled with certain information, including the percentage germination, when such germination is below a minimum percentage of germination fixed by regulation.

The Act prohibits the use of new variety names until licensed by the Minister, the use of false and spurious names, and provides for truth in advertising. The latter provision aims to suppress the use of unreliable claims made for seed for the purpose of effecting sales.

Provisions for the exporting of seed under grade, and the importing of seed under definite regulations, are also contained in the Act.

The exemptions under the Act are similar to the old Act with the exception as to its application to farmers. The only seeds from which a farmer is exempted, when selling on his own premises for seeding by the purchaser himself, are cereal grains, buckwheat, field peas, field beans, and corn. Exemptions are not provided, however, for these seeds if they are represented and sold as conforming to the provisions of the Act. Elite stock seed produced by plant breeders is exempted under the new Act.

Provision is made for an Advisory Board to meet when called by the Minister for the purpose of recommending legislation or regulations under the Act. On this Board the seed trade and seed growers are equally represented, with the Seed Commissioner as Chairman to cast the deciding vote when necessary.

An Act to Amend the Feeding Stuffs Act.—The Feeding Stuffs Act of 1920 is amended so as to require that bran, pure shorts, shorts and mill screenings, middlings, feed flour, be kept separate and distinct when offered for sale; that each be free from any admixture of materials foreign to the process of flour milling. Regulations are to be made to establish the percentage of protein and fat contents, and the fineness and quality of each of the products named. The amending Act also fixes the maximum amount of crude fibre that shall be permitted in each of the feeds as follows: Bran, 11·5 per cent; Pure shorts, 8·0 per cent; Shorts and mill screenings, 8·0 per cent; Middlings, 4·5 per cent; Feed flour, 2·0 per cent.

No person shall manufacture both pure shorts, and shorts and mill screenings at the same mill. The Act requires honest labelling of containers in which the feeds are put up for sale.

DOMINION APPROPRIATIONS FOR AGRICULTURE

The money voted by Parliament for carrying on the work of the Department of Agriculture for the fiscal year 1923-24 amounts to the sum of $7,119,500. Following are the details with comparisons with the previous year:—

	1922-23	1923-4
	$	$
Civil Government	780,455	855,745
Experimental Farms	1,325,000	1,525 000
Entomology	28,000	30,000
Administration and Enforcement of Destructive Insect and Pest Act	240,000	310,000
Dairying	175,000	230,000
Cold Storage Warehouses, including grants to New Westminster Cold Storage, $10,000 and Grimsby Cold Storage, $30,000	51,000	50,000
Fruit	157,000	182,000
Health of Animals (Administration and enforcement Animal Contagious Diseases Act and Meat and Canned Foods Act) including grant of $1,000 to National Veterinary Association	1,785,000	2,351,500
Publications	28,500	28,500
International Institute of Agriculture	15,000	20,000
Live Stock, including grant of $6,000 to Stock Growers' Protective Association	1,060,000	1,230,000
Seed, Feed and Fertilizer Control	275,000	295,000
Administration of the Agricultural Instruction Grant	20,000	20,000
Grant to the Provinces of Canada for the purpose of assisting and encouraging agricultural instruction, grants to be made on a proportionate basis	1,100,000	900,000
For experiments in the dehydration of fruits and vegetables	.....	10,500
For expenditures in connection with trial shipments of chilled beef and fat cattle to Great Britain	.....	25,000
For the suppression of foul brood in bees	.....	5,000
For the salary and expenses of an Agricultural Produce Marketing Agent in Great Britain	.....	7,000
Miscellaneous items	49,503	.....
	7,089,458	7,119,500

DOMINION EXPERIMENTAL FARMS

THE EXPERIMENTAL STATION, SCOTT, SASKATCHEWAN

By M. J. TINLINE, Superintendent

THE Scott Experimental Station is located 100 miles west of the city of Saskatoon, and about 50 miles from the eastern boundary of Alberta, close to the Canadian National Railway and adjacent to the town of Scott. The vast, treeless plain on which the Station is located is broken only by occasional ravines and a few small lakes. The altitude is 2,153 feet above sea level. The climatic conditions are somewhat similar to those existing in Manitoba and southern Saskatchewan, except that the yearly precipitation is approximately three inches less than is recorded at Brandon or Indian Head.

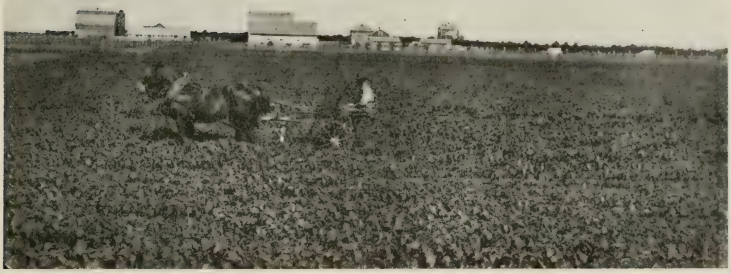
The district was first settled in 1906 by homesteaders, whose nearest railway point was Battleford. The railway construction reached Scott in July, 1908. The Experimental Farm first consisted of 198½ acres of virgin prairie, a part of which was broken in 1910. In 1911, experimental work was started under the direction of Mr. R. E. Everest. In 1914, approximately 320 acres were added, of which about 200 acres was arable

land, the remainder being ravines which can only be used for pasture land.

The soil is a chocolate clay loam, fairly uniform, and is representative of the soil in many parts of the open plains sections of the Province. The fact that the soil is rich in plant food has been fully demonstrated by the high yields that have been secured in years when crop conditions were favourable.

The meteorological records at Scott Station for a period of eleven years show the annual precipitation to average slightly less than 14 inches. In only one year has the amount of moisture recorded exceeded 20 inches, and in two years it has been less than eight inches. The problems confronting the settlers and experimentalists are, therefore, essentially dry farming problems. They differ from the problems prevailing farther south in that the growing season is shorter and the summer nights are cooler.

Because the land could be quickly and cheaply brought under cultivation, the settlers naturally first turned their attention to the production of wheat, although flax, oats and barley were also grown. Later, livestock and poultry in limited numbers were raised on some farms. Some of the pioneers planted trees and, a few, vegetable gardens. Some of the settlers had had experience in other districts, which benefited them but little in this new climate; others were inexperienced. This made it necessary that the Experimental Farms should conduct experiments not only with grain crops, which were the main source of revenue, but that they experiment with livestock, poultry, forage crops, etc.



The Scott, Saskatchewan, Experimental Station. General View.

Experimental work with cereals, crop rotations and cultural investigations was started in 1911. In 1912, an orchard, lawn and arboretum were established. In 1913, forage crop experiments were begun. Swine and sheep were introduced in 1916, but owing to the scanty pasture supply and lack of buildings, experiment with cattle were limited to winter finishing steers for market, until

1921, when the nucleus for a herd of Shorthorns was received from the Indian Head Experimental Farm. Horse breeding operations were started in 1911, and sufficient colts were raised to supply the horse labour for the rapidly increasing work on the Station. Four pure-bred Percherons were secured in 1920, which by natural increase have doubled their numbers. Twelve other work horses are required on the Station at present. There are now twenty-four pure-bred Shorthorns in the herd, and experimental work in winter feeding steers is still carried on each year. The flock of sheep, numbering 172 head, is composed of pure-bred Shropshires and Cheviots, and grade Shropshire, Cheviot and Rambouillet.

The main line of experimental work with sheep has been to determine the profitableness of this class of livestock for the dry land farmer. Pasture experiments with sheep have shown that sweet clover has a greater carrying capacity than any other forage crop. Experiments conducted during the past year have shown that the heavy losses resulting from goitre in lambs, which is so common in the West, can be largely prevented by the feeding of potassium iodide. Swine have proved profitable for the dry land farmer to keep, providing they are properly housed, fed and marketed. The experiments have included cross-breeding; methods of feeding, such as whole grain vs. crushed grain, rye vs. barley, self-feeder vs. trough method of feeding; pasture vs. no pasture, and buttermilk vs. no buttermilk. The results from these and other experiments are included in the Interim Report of the Station for the year 1922.

The winter feeding of steers has proved a profitable venture and is being encouraged as a means of increasing the farm revenue. This work provides employment for the surplus farm labour during the slack winter period; it permits marketing coarse grains profitably, and provides fertilizer that can be returned to the land to increase crop production. It is commonly supposed that the application of barnyard manure on the prairie soils is a waste of time. Experiments conducted at Scott during a seven-year period have clearly proved that it is profitable on the chocolate clay loam to apply all the manure that can possibly be obtained. The increase in yield from the first cropping period has paid for the cost of applying, and the beneficial effects of the manure continued through a period of several years.

Cultural Investigations

The farmer in the semi-arid districts depends mainly on frequent summer-fallowing to maintain crop yields. The experience in this district in recent years is that the summerfallow does not produce the increase in yields that has been claimed for it. This is no doubt due in part to the method of summer-fallowing. Experiments at the Station have demonstrated that the time of ploughing the summerfallow is much more important than the depth of ploughing. The earlier in the spring it can be ploughed, the greater the yield the following year; while a fairly complete set of experiments have failed to show any increase from ploughing deeper than six inches. Twice ploughing in the one summer has failed to increase yields, but it has kept weeds and grass in control better even than once ploughing. Crops of peas and vetches ploughed under for green manure have failed to increase yields of grain crops the following season. Commercial fertilizers have been unprofitable.

Two new lines of work are (1) ploughing the fallow in the autumn and cultivating throughout the next summer, and (2) growing grain in rows and intertilling instead of hav-

ing a bare fallow. During past years, turnips have been used as a summerfallow substitute, but the grain crops the next year have invariably been light. The turnips grow late in the autumn and thus exhaust the moisture that might be stored from the fall rains, and there is no residue from the turnips to hold the snow as there is from the grain crop grown in rows.

Experiments to determine the best method of handling the stubble from the first crop of grain after summerfallowing have shown that, where the land is clean and a good burn can be obtained, ploughing is unnecessary. On the mellow soil on the Station, sowing this land with a disc drill was all that was required. Owing to the fact that so much of the land in the district is poorly worked during the summerfallow year, this plan has not been profitable on many farms. The weeds and grass have grown up and robbed the grain crop of the moisture it so badly needed, and poor yields and weed infested land have resulted.

Spring ploughed land has generally given considerably higher yields than have fall ploughed fields. In fact, the experiments have shown that the destruction of the stubble in the autumn, whether by burning, discing or ploughing, decreased the returns to a marked extent compared with where similar work was done in the spring. The snow that packs in the stubble during the winter is evidently of great importance in districts where the rainfall is as light as at Scott.

A number of crop rotations were started on the Station in 1911. These included, first, the crop arrangement followed in this district, namely, wheat, wheat, summerfallow. In a second rotation the plan followed was to have one-half of the land producing grain, one-third down to grass and one-sixth summerfallow. Two other rotations were established to include peas, grass crops and the application of barnyard manure. Owing to the weeds that came up among the peas after the land was under cultivation for a few years, it was thought advisable to substitute sunflowers for peas

The Scott, Saskatchewan, Experimental Station.—Experiment with intertilled crops.

in one of these rotations and to mix sweet clover seed with western rye grass. One rotation did not prove satisfactory, and a number of shorter rotations more suited to dry farming conditions were started in 1921. One of these, known as a sweet clover rotation, is of particular interest at the present time. The crop sequence is: summer-fallow; wheat (on half the field, sweet clover is sown with the wheat. In the third year of the rotation the field is half sweet clover and the remainder oats. In the second cycle of the rotation the sweet clover is grown on the other half of the field.

Forage Crops

During the first years of settlement native upland grasses provided ample pasture and hay. The breaking of the native sod proceeded rapidly, with the result that, in a comparatively few years, hay became scarce and close grazing had decreased the carrying capacity of the pasture land. The inevitable result was that stock owners disposed of part of their herds. Grain farming proved profitable for a time, but an increase in weeds in practically every district, soil drifting in sections with light or loose top soils, insect pests, and rust in some sections, compelled farmers to turn their attention to diversified farming which should include the keeping of some live stock.

Foreseeing that the single crop system could not continue indefinitely, the Experimental Station has been conducting numerous experiments to determine the best method of seeding down to grass, the best crops to grow for pasture, and the best crops to provide roughage for winter feeding. These experiments have proved that it is possible to seed down to western rye grass with a nurse crop, that the introduction of grass in a rotation will aid in increasing the yields of grain following the grass, and that cultivated grass is not a profitable pasture crop. The experiments have shown sweet clover to be an outstanding pasture crop for most kinds of stock, while for swine, rape has proved the most satisfactory.

The Station commenced investigating the suitability of sunflowers for silage shortly after the Montana Station had pronounced them satisfactory for this purpose. One of the first silos in North-western Saskatchewan was erected at the Station. The silage, fed to steers that were being fattened for market, proved that it was worth $10.12 per ton during a three year period.

The information regarding the experimental work with forage crops was summarized in Circular No. 107, published in 1922.

Cereals

Experimental work with cereals has always received special attention on this Station. During the first years after the Station was established it was considered important that early maturing varieties should be tested in order to have the crops mature without frost damage. Repeated experiments have proved that the later maturing varieties give much heavier yields. This information has been placed before the farmers, and in one instance it is known to have prevented the farmers of a certain district from sowing several hundred acres of an early maturing variety of oats, which would have resulted in a loss in yield of at least from 10 to 15 bushels per acre. This estimated at even the low figure of $5 per acre would have meant a loss to these farmers of $3,500 in the one year.

Each season a number of crossbred sorts and selections, made at the Central Experimental Farm, have been tested to determine their usefulness for northwestern Saskatchewan conditions.

Testing newly introduced varieties has had a good effect in preventing the multiplication of varieties by the

process of giving some old variety a new name.

The multiplying of specially selected stock, secured from the Central Farm, has been followed. This work has been of great assistance in providing seed growers with good northern grown foundation seed at prices that were remunerative to the Station, while not being prohibitive to the grower.

Horticulture

Realizing that happiness and contentment are of greater importance than prosperity in inducing the settlers to decide to make the prairies their permanent place of abode, the Experimental Station has always, by precept and example, striven to encourage the planting of trees and windbreaks, the beautifying of the home surroundings with shrubs and flowers, and the establishment of gardens for vegetables and small fruits. The results of this work are quite apparent, particularly in the small towns and villages, a number of which have made a commencement in street tree planting, while the improvements in the village home surroundings are quite marked.

Owing to there being no native growth of trees or shrubs to guide the settlers as to what would grow on the prairies, and to few having any knowledge of horticultural work, it was necessary that investigational work should be started in order to determine what would grow under northern dry farming conditions. The second line of work was to determine the best cultural methods to employ in growing horticultural products. In this connection it is interesting to note that while apples have not thrived well, native Manitoba plum trees, secured from the Brandon Experimental Farm in 1914, have proved hardy and have, during the past two years, produced fair crops of from fair to good quality fruit. There has always been some doubt as to whether evergreen trees would thrive on clay soils on the open plains The work of the Station has clearly demonstrated that white spruce and lodge-pole pine grow well here, and that a number of other evergreen trees can be grown. The cottonwood trees that thrive well in the dry districts farther south, winter kill badly in some years, while Russian poplar has proved hardy and a rapid grower.

The question of which way to run hedges for shelter for fruit trees is important, and it has been found that a more uniform distribution of snow resulted from having the hedges run east and west, and less breaking down of the branches on fruit trees occurs than where the hedges and trees run north and south.

The value of the windbreaks in protecting crops and in collecting snow to provide moisture for growth for the crops has been particularly evident during the last three years. Potatoes were grown inside the protecting hedges and in the open fields. The increase from the protected crops amounted on an average to over 100 per cent.

There has been some doubt as to which of the more frost tender of the commonly grown vegetables and flowering plants could be grown. The experiments have shown that, with proper care and by using a hotbed to start the more tender plants, everything that can be grown in the south of the province will thrive here.

THE EXPERIMENTAL STATION, LACOMBE, ALBERTA

By F. H. REED, Superintendent

THE Dominion Experimental Station for Central Alberta was established at Lacombe in March, 1907. Lacombe is centrally located in one of the largest live stock and mixed farming areas of the West. It is easily accessible, being located 115 miles north of Calgary and 80 miles south of Edmonton, on the Calgary and Edmonton trail, and on the Canadian Pacific line between Calgary and Edmonton. The C.P.R. also operates a line running east from Lacombe, and the Lacombe and Northwestern Railway line has opened up a large, new district to the west and north. The Canadian National Railway has a right-of-way into the town from its line five miles south.

The altitude of the Canadian Pacific railway station is 2,795 feet above sea level and its situation is 52° 28′ latitude and 113° 44′ W. longitude. The Experimental Station is situated about one mile southwest of the railway station and just on the southwest corner of the town.

The topography of the district shows a series of broad, fertile valleys. These valleys become broader and shallower towards the east until the open prairie is reached; while, towards the west, the valleys become narrower and the land rougher as the foothills grade into the mountains. The same type of country extends, with slight variations, southward as far as Calgary, and northward throughout the entire Edmonton district, and is situated in, or constitutes, the park belt of Alberta.

The soil of the district varies from a sandy to a dark chocolate loam, varying in depth from one to three feet, and is underlaid by a deep subsoil which varies from a gravelly loam to a stiff clay. The 490 acres of land on the Experimental Station, while fairly uniform in character, varies in places from a rich black loam four feet in depth, with stiff clay sub-soil, to a sandy loam one foot deep with sandy sub-soil. The farm is quite representative of the district.

Precipitation and temperature have proved to be the limiting factors in agricultural production in Central Alberta and the investigational work in agronomy conducted by the Station has largely consisted in determining the varieties of farm crops which will mature and produce maximum yields in the comparatively short growing season and the evolution of a suitable farm rotation which will not quickly deplete the soil of its virgin fertility and will still produce a profit under our particular conditions as to soil, topography, climate, markets, and transportation. The climate, topography and soil of the district make it particularly suited for live stock, hence work with live stock at the Station is one of its strongest features, and it naturally follows that investigational work with forage crops must be one of the most important branches for field crop experimentation. In outlining all experiments, the object has been to assist farmers in solving their present problems and to anticipate any problems that might arise as a result of the country merging from the ranching and homestead era into a highly developed type of agriculture. As some of the land at this Station has been under cultivation for thirty-one years, it is particularly adapted for this work.

Agronomy

Meteorological observations have been taken since 1908 and are important, for upon the general weather

conditions prevailing throughout the year, and particularly during the growing season, depend the quantity and quality of the crops grown. The average precipitation for the year 1908 to 1922 inclusive has been 17.034 inches. Of this, 61.47 per cent was received during the months May, June, July and August. The timely occurrence of this precipitation is partly responsible for the bumper crops usually harvested in the district. While June, July and August are the wettest months of the year, they also have the highest temperature. This moisture and heat, combined with sunshine from three o'clock in the morning until nine o'clock at night, forces a very rapid, strong growth.

When the Station was started in 1907, settlers were coming into the district in very large numbers, and these newcomers looked to the "Government Farm" as a reliable source of information. The first work was to determine what varieties of oats, wheat and barley were best adapted to the district, and extensive variety tests were carried on. The next problem was suitable crop rotations, with the ever-present problem of methods of weed control and eradication as the feature. Thirteen different farm rotations are now being carried out on areas large enough to permit of accurate cost of production results being secured. In 1911, an extensive series of cultural experiments was started. These comprised tests of many methods of stubble treatment, summerfallow treatment, depths of ploughing, applying manure, dates, rates, and depths of seeding, methods of seeding down grasses and breaking sod, and the growing of roots and silage crops. The nine years' results now available from these experiments have provided very valuable information for both old and new settlers. As the country became settled, wild hay and pastures disappeared, and much work has since been done in testing varieties and strains of cultivated grasses hardy enough to stand the cold winters and, often, dry springs. It has been found that brome and western rye grass and some strains of alfalfa and sweet clovers from northern grown seed are quite hardy, and, in wet years, timothy will also produce heavy yields. More recent work has been the testing of varieties of corn and sunflowers for the production of silage crops.

In 1921, a new series of cultural experiments was started, based on the results of the previous experiments, and designed to cover some of the more recent problems of soil drifting, summer fallow substitutes, growing of grain in group rows, etc. This work requires eighteen acres divided into 480 plots. The thirteen rotations now under trial require 253 acres, divided into 52 blocks or small fields.

Since the Station was started in 1907, 55 varieties of spring wheat, 65 varieties of oats, 70 varieties of barley, and 25 varieties of field peas, have been grown on the variety plots. While a few of these have been found to be particularly adapted to the conditions of the district and have given outstanding yields, many varieties have proved quite unsuited and have been discarded. Similarly in the tests of grasses, clovers, corn, and sunflowers, with 25 strains of western rye, 15 of red clover, 5 of white Dutch, 5 of sweet clover, 8 of alfalfa, and 8 varieties of sunflowers and 14 varieties of corn, now under trial, results are proving that, while a few varieties and strains are well adapted to Central Alberta conditions, many are quite useless, and yet all of these varieties and strains of grains and grasses are to some extent on the market.

Live Stock

As, for the first few years, the Experimental Station included only one-

quarter section, very little work was done with live stock, but, with the development of the live stock industry in the district, herds of beef and dairy cattle were started, and, later, hogs and sheep. As Central Alberta has become one of the leading live stock areas of the West, the live stock at the Station has been increased until it is now one of the largest live stock stations of the Experimental Farms System.

Space will permit of only a brief mention of the live stock work and the numbers of animals used in the experiments. The herd of cattle kept by the Station numbers some 140 head. Two breeds, Aberdeen Angus and Holsteins, in approximately equal numbers, are kept. With both breeds, the cost of maintaining and developing the different classes of stock has been kept. In beef cattle, owing to lack of suitable stabling for such a large herd, work consists mainly of the development and distribution of breeding stock. With dairy cattle, however, more comprehensive work is under way, the chief lines being the testing of home-grown feeds for feeding for high production, the development of high producing strains of pure-breds, and the grading up of high producers from common grade cows. So far, very few breeding females have been sold, but annually several young bulls, of both the Angus and the Holstein breeds, have been sold to breeders in Alberta and British Columbia. All pure-bred milking cows are entered in the R.O.P. and R.O.M. tests and some very creditable records have been made. Sufficient milk from this herd is separated for feeding the young stock and the balance is manufactured into cheese in the dairy at the Station.

Some 900 sheep are kept by the Station. These are all used in a grading-up experiment, consisting of the use of pure-bred rams of Hampshire, Oxford, Shropshire, Leicester, Cheviot, and Corriedale breeding on common range ewes. This experiment has progressed to the second and third cross. With this flock, numerous experiments are conducted in methods of breeding, feeding and management.

The swine kept at the Station number about 300 head, of three breeds, Yorkshire, Berkshire and Duroc-Jersey. The three breeds are compared for prolificacy, economy of pork production, and suitability for the production of "select" bacon hogs. The large numbers of hogs kept allows feeding experiments to be carried on with duplicate lots. The home grown grains, oats, barley, and low grade wheat, have been tried in almost every possible combination with and without skim milk and buttermilk, with and without pastures of many kinds, and fed by hand and in self feeders. This year, special attention is being given to the influence of feeds and methods of feeding on the suitability of the finished hog for bacon production. Annually, large numbers of young sows and boars are sold throughout the Province for breeding purposes.

Three breeds of horses are kept, Hackney, Clydesdale and Shire. The five Shire horses donated to Canada by the English Shire Horse Society have been located at the Station. The three mares will form the foundation of a Shire breeding stud, and the two stallions are available to farmers to demonstrate the suitability of the Shire in producing draft horses of good type and size. Some breeding work has been done with pure-bred Clydesdales, but the Clydesdales, both grade and pure-bred, have been used mainly for the farm work. The Hackneys have been used as drivers and delivery horses.

White Wyandottes, Barred Rocks, and Single-combed Rhode Island Reds are the three breeds of hens kept, while Toulouse and African geese and Pekin ducks complete the

list of poultry. Practically all the young males available are sold to farmers in the surrounding district. In addition to the usual care and management experiments, pedigree work is under way with each of the three breeds of hens.

Horticulture

In horticulture and gardening, the Experimental Station at Lacombe has been of great service to the farmers of Central and Northern Alberta. It has demonstrated that probably in no part of Canada can vegetables and bush fruits of higher quality be produced, and that every farmer can, with a little effort and care, have a good farm garden. All the common vegetables do well in this soil and climate. Red and black currants and raspberries give heavy yields of excellent fruit and, with a little extra care, strawberries yield well. The arboretum contains the oldest and most complete collection of trees and shrubs north of Calgary, and an endeavour is being made to test all the perennial and annual flowers likely to prove suitable to northern conditions. As the country becomes older, these data are much in demand by farmers who are laying out lawns and gardens around their homes.

It is not possible, in an article of this kind, to give more than a brief summary of the different lines of work under way at the Station. The majority of our activities are of such character that a correct estimate of their value to the province is impossible. The Lacombe Station, however, has now been in operation for fifteen years, and its work has been closely followed by farmers, many of whom have repeatedly turned to the Station for suggestions, as new problems developed in their farming operations.

While, perhaps, the pioneer problems of farming in Central Alberta may now be said to have been fairly well solved, these have been and are being followed by others, of a more difficult and complex character, as farming operations have become diversified, markets have widened and cultural requirements have changed. Especially during the recent years of light rainfall, small yields and low prices, has the need of best varieties, best cultural methods, best breeding, care and management of live stock—all leading to lowest cost of production and greatest output—been most keenly felt. That this is realized by the farmers of Central Alberta is well shown by their interest in the work being carried on in their behalf by the Lacombe Experimental Station.

SEED GRAIN COMPETITIONS IN THE PROVINCE OF QUEBEC

By JULES SIMARD, District Inspector

SINCE 1920, endeavours have been made by the Quebec office of the Dominion Seed Branch to improve the grain crops of the Province by arranging seed grain competitions among farmers. These competitions are really standing crop competitions, extended as far as the preparation of the seed for sale.

The scheme was launched in 1919 when trial competitions were organized in the counties of Rimouski and Champlain, with a total of 103 entries. The object was to fill the gaps existing in the system that had been followed up to that time, and to generalize the use of good seed by making known the methods of selection

and spreading their use among the farmers. To this end special instructions are given for the growing of seed grain, and cash grants are awarded to the farmers who grow a specified quantity according to those instructions.

The contests are organized under the auspices of the agricultural associations, with the co-operation of the Ottawa and Quebec Departments of Agriculture. A farmer desiring to enter the competition is required to own a certain amount of registered seed grain, or, at least, grain of a known variety and of standard quality. The variety must be approved by the Department. An area of three acres is necessary for a first examination of the standing crop, and points are given according to the general appearance of the crop, the absence of weeds and diseases, the system of cultivation, etc.

In the standing crop competitions, which were the only contests held previously, the work was limited to one inspection, and the prizes were awarded to the owners of the best fields. Well-to-do farmers sometimes entered these competitions only from a speculative point of view, and without obtaining results that would prove of use in the improvement of cereals. In the present seed grain contests, the farmer is required to prepare a large proportion of this grain for seed. On the second or cleaned seed inspection he is scored according to the thoroughness of the work done during the course of all his operations. Herein lies the superiority of the seed grain competitions over the standing crop competitions.

Since the establishment of these contests, the number of entries has been constantly increasing, and the quality of seed grain produced has steadily improved.

The following results were obtained during the last three years:—

Number of Counties	Number of Competitions	Number of Entries	Quantity of seed inspected	Percentage of seed under the grades			
				No. 1	No. 2	No. 3	Ungraded
			Year 1920-1921				
11	16	472	8,885 bush. oats	.....	.....	.....	.....
			9,720 lbs. clover	.....	.....	.....	.....
			Year 1921-1922				
15	24	644	13,225 bush. oats	23	2	.....	75
			6,900 lbs. clover	23	9	28	40
			Year 1922-1923				
18	29	1,297	28,400 bush. oats	33	50	17	.....
.....	.....	.....	7,500 lbs. clover	17	20	22	43

Before these competitions were established, standing crop competitions and seed grain exhibitions were held to encourage the farmer in the production and use of good seed. While these organizations gave good results, they did not induce the farmer to sow the whole of his farm with seed of good quality. Under the combined field crop and cleaned seed competitions a certain amount of grain—25 bushels for oats—must be treated for seed, the competitor is enabled to use seed grain that has been selected, and of pure variety and thus see for himself its advantages and superiority over ordinary seed grain, both by the increase in yield and the smaller number of weed seeds that it contains. He can therefore appreciate the benefits derived from selected seed and better understand the necessity for this work. He also becomes familiar with the best methods of cleaning the seed, and he introduces good seed-cleaning machines on his farm.

While inspecting threshed grain on the farm, judges may give useful advice regarding the methods of selection, the importance of this work, and the identification of noxious weeds, and they sometimes help in the sale of surplus seed grain.

Many farmers who have entered these competitions regularly are now convinced that the productivity of a variety is maintained and even increased by selection. Many also sell large quantities of seed grain and are among the most successful competitors at exhibitions.

The number of contests shows a steady increase since they were established—a sufficient proof of their popularity among farmers and of the benefits derived from them. The consensus of opinion is that the competitions are a means of distributing good varieties of grain among the farmers, that they encourage the use of methods of selection, and create an elite of farmers who are able to produce seed grain of good quality, of uniform variety, well adapted to climatic and soil conditions. These organizations have brought about a noticeable improvement in the quality of seed used in the province of Quebec. They have also been an important factor in increasing yields, as well as a practical means of making known the basic principles involved in the improvement of cereals. It is to be hoped that the good effects of this work will be felt for many years to come and that, as it becomes generalized throughout the province, the average yield of cereals will show a decided increase.

PART II

Provincial Departments of Agriculture

THE LIVE STOCK OUTLOOK IN SASKATCHEWAN

By A. M. SHAW, Professor of Animal Husbandry, College of Agriculture, University of Saskatchewan

IN discussing the question with farmers of the West, one is struck by the great divergence of views with regard to the outlook for live stock raising in the Province of Saskatchewan. Many people will tell you that it is not promising. Others farming in the same district, say that live stock—milk cows and chickens, have been their mainstay. Both parties are speaking from experience. How can we reconcile these two widely different conclusions? Are there two answers to this question? We think not. We venture to say that the first answer is prompted by the experience of a man who has tried to handle live stock on a comparatively large scale without much previous experience: who has endeavoured to handle live stock much as he would handle grain growing. His answer will always be the same because his methods are fundamentally wrong, and can never succeed except in exceptional cases. The second answer is prompted by the experience of a man who has kept live stock on a small scale as a means of livelihood and not as a money making venture. His answer also will always be the same, because his methods are fundamentally right, and when intelligently followed, will invariably bring success.

That live stock raising, or farming with live stock, should form an integral part of their business, is not well understood by all western farmers. Many of them have had little or no experience in the handling of farm animals other than horses. When these men, owing to difficulties encountered in straight grain growing, decide to go into live stock raising, they make the mistake of investing too heavily before they have learned the business or made the necessary changes in their system of farming, which eventually must take place when live stock raising is included in their farming operations.

All farmers recognize the importance of getting the land ready and the crop sown at the proper time. They know the importance of good seed and proper tillage methods. They know that a delay of a few days often means the difference between a good crop and a failure. They know the importance of having proper seeding and harvesting machinery. In fact they make full preparation, usually, for caring for the crop from seed time to harvest.

Do they all realize, however, the importance of keeping their live stock in good thrifty condition at all times, the importance of having their calves come at the proper time, and of caring for them so that they will be of the right age and weight at the proper time? Or, in the case of dairy cattle, do they appreciate the importance of adequate shelter and of proper and abundant feeds at all times?

To the uninitiated, sheep raising seems to present few difficulties. A man and a dog may look after a flock of many hundreds for months at a time. It looks easy, and it is easy to the man and his dog because they

have learned their business; they have had years of experience and know sheep and can anticipate and provide for every need. Turn them over to a novice and how quickly you will note a change in the well being of the flock.

It is no easy matter to change a straight grain growing business into one where live stock is included. Many changes must take place. Pastures must be provided, forage crops grown, intertilled crops introduced, a certain amount of fencing undertaken, and a start made along the line of suitable buildings for shelter. This cannot be done in a day; many years must elapse ere farming methods suited to grain growing—and after all they form a very large part of the methods in vogue in Saskatchewan—can be changed to include live stock as an integral part of the business. But the change must come. Farmers everywhere in the West are looking for a way out of their present difficulties. We think it lies in this direction, and that is why we are firm in our conviction that the outlook for live stock in Saskatchewan is promising, not immediately, perhaps, but eventually.

Live stock of all kinds yields the greatest return when kept in comparatively small numbers. Thus it is evident that the small or medium sized farm is the ideal unit for establishing a balanced system of farming. Handling live stock profitably on a very large scale is difficult in the extreme, except along certain very definite lines. For instance, a large grain farm could easily, and with profit, feed and finish steers or lambs during fall and winter months without interfering with its regular farming system. The question immediately is asked, Does it pay to feed cattle? This is answered beyond a question of a doubt by the results of experiments conducted by the Dominion Experimental Farms for the past twenty-five years. In each year, their cattle feeding operations have shown a profit, and in many of their trials the price obtained for coarse grains when fed to stock was more than double the market price, when sold as grain.

At the present time thousands of feeder cattle are being sacrificed on the western markets, selling for 2 cents to 3 cents per pound. These same cattle, if carried over until next spring and well finished, would bring from 7 cents to 8 cents per pound. Experienced cattle feeders claim that a spread of from 1¾ cents to 2 cents between buying and selling price is sufficient to yield a profit to the feeder. In Western Canada the spread is double this amount almost every year. No argument can be put forward to prove that cattle feeding can not be carried on successfully in Western Canada. All the existing evidence goes to show clearly that it can be made to yield a handsome profit.

There is a lot of good blood in the live stock of Western Canada, evidence of which can be seen by the types and sound colours of the cattle on any western market. Lack of condition and finish are, however, painfully evident. Cattle are being marketed in an unfinished condition, and at the wrong time of year. This is conclusive proof that the men engaged in the business have not as yet thoroughly mastered it. They very frequently ship cattle apparently without any regard for the condition of the cattle or the condition of the market. This is one of the main reasons why our western cattle markets are in their present condition. They are glutted with cattle unfit for the trade. Good, well finished cattle are selling at fair figures even now.

How can progress be made along live stock lines? As has been already stated, the small or medium sized farm lends itself best to the successful

handling of live stock. The reason for this lies in the fact that live stock farming at its best must be carried on by the farmer and his immediate family, with perhaps one additional man by the year. This means that the number of animals kept must be limited. The actual numbers for a quarter or half section farm can not be stated definitely as the nature of the soil, the district in which the land is located, together with many other factors, will all have a bearing on the question. As a rule, however, the average farmer would be well advised to confine his efforts to the handling of from 5 to 15 milk cows, 8 to 10 steers for finishing, a flock of from 20 to 30 ewes, 1 or 2 brood sows, a flock of from 25 to 50 hens, and probably 4 to 8 horses. It is not necessary of course that each farmer keep all of the above kinds of animals, but herds and flocks of this size have been found by the actual experience of practical farmers to give the best returns under ordinary conditions.

Steer feeding to many men means the handling of steers in car lots. This is not necessary nor advisable. This year, from 50 to 100 car loads of feeder cattle have been shipped from Western Canada to one Ontario district to be finished by Ontario farmers, very few of whom will actually feed more than 8 or 10 head. This is true of dairying as well. Frequently, greater profits are derived from the milking of a few cows than when we endeavour to operate a large herd. Especially is this true in the case of beginners, and this is the class in which the majority of western farmers find themselves, as far as balanced farming is concerned.

Good breeding is essential, the use of pure-bred sires of the correct types imperative, but just at present, above all else, knowledge of proper methods of care and management is required. This can be gained best by experience, and for this reason the change that is at present taking place in Saskatchewan farming will proceed slowly but surely until some day western agriculture will be on a much firmer basis than it ever was before. And when that day comes it will be found that, to a very great extent, the live stock industry has become the mainstay of the average farmer of Western Canada.

GRASSHOPPER CONTROL IN ALBERTA

By C. G. GROFF, Editor of Publications, Department of Agriculture, Alberta

THE Province of Alberta spent just over half a million dollars in the season of 1922 in the destruction of grasshoppers, but saved to the farmers of the province approximately 20 million dollars' worth of crop, according to returns received by the Department of Agriculture from municipal secretaries and others. Of the total cost of $512,253, the municipalities and local improvement districts are charged with $257,040, the Provincial Government bearing the balance. The story of the campaign and its immense success forms an outstanding example of the successful result of organized and concentrated government, municipal and community effort. Not only government officials, but municipal authorities, farmers, and even the citizens of the towns and some of the cities in the infested area, played their part in winning victory over a pest that threatened to wipe out the crop vegetation and rob the farmers, over nearly three-quarters of the crop-producing area of the province, of the fruits of their labours.

The same effective organization has been maintained for 1923, with the inclusion of two or three new areas. So successful was the campaign last year, however, that several communities thought their troubles in respect to grasshoppers were over, and became somewhat off their guard this season, with the result that poisoning was not done in these particular districts early enough, and there will be a small percentage of loss there. But with the campaign proceeding vigorously along the lines established in 1922, and with the infested areas now greatly reduced, the outlook this season is for a very small percentage of loss over the province, and the feeling is given support in government circles that the pest is being brought very effectively under control.

One of the results of the effective campaign of last year is that there is no serious infestation save in the south-eastern portion of the province bordering on Saskatchewan, in the territory east of a line from Lethbridge to Youngstown.

Grasshopper infestation in Alberta became serious some years ago, but aside from government efforts to educate the farmers in the matter of applying poison bait, and to provide material at certain centres, there was no real or united effort to combat the pest. It was at the beginning of 1922 that the Minister of Agriculture and his officials realized that a combined effort on the part of all concerned was needed if the crops of a large portion of the province were to be saved from devastation. Alberta by this time had begun to feel the effects of lack of action in Montana, where infestation was enormous, and from which large flights into Alberta had taken place. This, combined with ever-increasing local infestations, and the realization that individual effort on the part of farmers alone could avail little in checking the pest, brought the situation to the stage where organization of every available force was necessary. The Minister of Agriculture determined on such an organization. The government force was organized, and the councils of rural municipalities, villages, towns and even cities were brought into line in a great co-operative war on the hoppers. Every possible medium of education was utilized. Pamphlets describing the bait and its use, and the construction of mixers were issued and scattered broadcast. Meetings were held at every possible point, and newspapers gave generously of their space.

During the session of the Legislature a Pest Act was passed, making it compulsory for farmers to take action to destroy the hoppers, and also providing machinery for organization.

The organization was placed in charge of Z. McIlmoyle, Assistant Deputy Minister of Agriculture, with Prof. E. H. Strickland, Entomologist of the Alberta University, and former Dominion Government Entomologist, in charge of the field work. The organization included 170 municipal and local improvement districts, exclusive of the Peace River district, the area infested comprising almost the entire portion of the province south of the City of Edmonton.

The government force consisted of 22 supervisors, each of whom had under his jurisdiction some 6 municipalities or improvement districts. Under the direction of these supervisors the responsibility for the campaign was placed on the council of each municipality, with each councillor responsible for his own division. Materials were supplied to these municipalities at half price. The municipalities hired their own men and set up their own bait mixers. In local improvement districts the government agent organized the district and held meetings, scouts were appointed to see that infested areas

were poisoned, and the government supplied the bait mixers and paid the men who ran them, the cost being charged against the district.

District centres for the distribution of bait material in less than car-lots, were established at Edmonton, Calgary, Lethbridge, Medicine Hat and Munson. Carloads of material were shipped direct from supply houses to districts requiring them.

A total of 215 bait-mixing stations were in operation, and some of them ran night and day. In addition to the government force of 22 supervisors and two clerks, 183 men were used in local improvement districts, as well as the large staff used by the various municipalities.

The materials used during the campaign included 668 tons of molasses, 642 tons of arsenic and paris green, 6,413 tons of bran, 6,959 tons of sawdust, 810 tons of salt, 142 gallons of amylacetate.

Community campaigns were undertaken in several districts with great success. The first to be organized was at Crystal Lake, under H. L. Seamans, the Dominion Government Entomologist at Lethbridge. Every breeding ground and infested field in the area covered by this community organization was poisoned by the united action of all residents within a period of three days after the hoppers first made their appearance. Such concentrated effort so greatly reduced the pest that very little individual action was required during the remainder of the season, and the destruction of crops was reduced to a minimum.

The contrast was noted in an adjoining district where every effort made to obtain concerted action failed, and where individual farmers were loth to apply bait to land not their own till serious damage rendered such action imperative. It was then too late to obtain best results. In this district immense quantities of bait were used continually throughout the season, but in spite of this there was some loss in crop.

Exceptionally good results were obtained in other districts where community action was taken, notably in the Pakowki Lake district, where, in spite of the fact that countless millions of the hoppers threatened destruction of all vegetation in several municipalities, the loss of crop was negligible.

The citizens of the city of Medicine Hat poisoned many square miles of severely infested land, the Rotary Club and Board of Trade playing a prominent part in the work, and similar campaigns were conducted at Lethbridge, and in the towns of Taber and Champion.

Species of Hoppers

The whole of the area covered by the organization was found infested with what is known as the Roadside Grasshopper. The eggs of this species hatched about May 26, and the hoppers were flying about June 28.

In the southern portion of the province, in addition to the roadside hopper, there was a severe infestation of the Lesser Migratory hopper, which covered a territory of about 50 districts, all lying south of the main line of the Canadian Pacific Railway. This species hatched about May 20, and were flying about June 26. In this territory also the two-striped grasshopper and the closely allied *Melanoplus gladstonii*, Mr. Strickland declares in his report, were present in destructive numbers. Throughout the province all species of grass-inhabiting hoppers were unusually abundant, but many were comparatively harmless. Mr. Strickland also states in his report covering the operations of last season that there is a gratifying increase in the numbers of parasites.

Bait Formula

The bait used in 1922 was composed of 50 pounds of bran and 50 pounds of sawdust, with five pounds of salt, and two gallons of molasses, five pounds of arsenic and ten gallons of water. As a result of last season's experiences, however, it has been found possible this year to cut the amount of molasses to one gallon or even ½ gallon per 100 pounds, and the salt and arsenic to four pounds each instead of five pounds. This has been found to give as good results and has reduced the cost considerably. To the formula described above, it was customary in some cases to add amyl-acetate to the extent of 3 ounces, after June 15, as an additional attractant.

In the handling of bait it was found that the bait became more effective if allowed to stand two or three days to become slightly sour, and then re-moistened before being scattered. The bait should not, it was found, be kept more than six days.

Time to Apply Bait

Bait was found to be most effective when applied between the hours of 6.30 and 10 in the morning, before the bait had dried out under the sun, and during the hours when the hoppers were feeding. Bait scattered before sunrise, or later in the day or in the evening, was found generally to be ineffective.

Method of Applying

The general method of applying bait to grain fields was to scatter it along the edges of the fields. This method was adopted particularly for the roadside grasshopper, but the lesser migratory species had to be met by application of bait throughout the entire field in strips of from two to five rods apart.

Vacant Land

The great areas of vacant land in the province were found to be infested only with the comparatively harmless grass-feeding species. The foothill country and coulees, which in former years had proved fertile fields of infestation, were found to be almost entirely free of the pest. Excellent work was done by the railway companies and irrigation companies in the treatment of vacant lands where necessary.

Abandoned farms constituted a difficult problem particularly in the sandy areas of the south. Farmers neighbouring on these farms were urged to poison these areas, but this work required immense quantities of bait, especially when left till late in June, and rarely more than a 50 per cent kill was obtained. It is now recommended that municipal authorities have such farms burned over during the last week in May.

In the treatment of summerfallow, Mr. Strickland recommends the strip method of summerfallowing, the strips being poisoned before ploughing or discing is completed. This makes for economy in use of bait and is more effective.

Fields of rye were found to be infested and necessitated poisoning during the entire season. Fall poisoning is recommended for this crop, but spring poisoning should not start until the last week in May, when all the eggs will have hatched, says Mr. Strickland. If a portion of an infested field is to be cut for hay, it is advisable to cut in strips of one or two binder widths from 5 to 70 rods apart. Within a few days the hoppers will gather along the edges of the cut strips to sun themselves, and they can then be quite economically poisoned.

Danger to Stock

Where bait was left in bulk and easy of access by livestock, or where it was carelessly scattered so that there was any quantity in one spot, there was loss of livestock. With careful

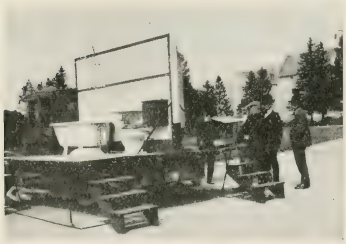
handling and scattering of bait according to directions, there can be no danger to stock.

Alberta learned some new lessons in the campaign, but the outstanding feature was the great success of the united campaign. Changes have been made in the Pest Act to make it more workable, and to lay penalties on those who waste bait unnecessarily.

THE WATER SUPPLY IN THE FARM HOUSE

By L. STEVENSON, B.S.A., Director of Extension, Ontario Agricultural College

A MOTOR truck with a specially constructed extension platform top, loaded with an exhibit of pumps, plumbing equipment, tools and demonstrating materials related to household water supply installation, left the offices of the Department of Agriculture on May 23 to tour Western Ontario. This demonstration on wheels was prepared under the direction of the Superintendent of Women's Institutes for the purpose of illustrating to the people of the rural districts the best way in which to install or improve the household conveniences so necessary in the reduction of labour in the farm home. Water in the kitchen, in the bathroom and in the laundry, together with the disposal of sewage, at a cost in keeping with the farm exchequer, the purchase of the proper type of equipment, and advice on farm plumbing were the main thoughts in the demonstration.



Motor truck demonstrating kitchen and bathroom equipment and installation.

Farm surveys have shown that too few farm houses are equipped with any water service, and that many are not taking advantage of the natural conditions that surround them. Carrying water from a spring when either a gravity line or a hydraulic ram would deliver a water supply at the kitchen sink is a waste of time and energy still being practised. The unsanitary cesspool is still being used in spite of the fact that the septic tank is known to many, and is a convenience within the reach of all. The demonstration was in charge of two capable officials, well versed in plumbing and sanitary engineering, and as prearranged and advertised, attended gatherings of rural people under the auspices of the local Women's Institute.

Complete plumbing equipment for kitchen and bathroom was set up and demonstrated at each gathering. The work of piecing together the various parts of the equipment was done in such a way as to make clear the mysteries of plumbing to the handyman of the farm, enabling him to return to his own home and put in like equipment with his own hands and tools. Plumbers' bills have frightened most farmers who have been unfortunate enough to see them, and it has been this high cost factor that has kept the labour-saving water equipment out of many farm homes.

One demonstration stand per day was the practice, thus giving the people of the various districts visited an opportunity of inspecting the ex-

hibit at their own convenience, at any time between noon and nine p.m., and of consulting with the officials in charge. A general meeting was held early in the evening at each point visited. The officials in charge were able to visit, on request, many farm dwellings and give expert advice on the ground, while passing from place to place during the early part of the day.

The attendance at these Farm Household Water and Sewage System Demonstrations was large and enthusiastic. It is the aim of the Department to encourage the development of an inexpensive and efficient form of plumbing equipment that is simple in installation, so that the farmer can install it himself. The bringing of water pipes into the house and the replacement of the old-fashioned dish pan by the modern sink is the first object sought. With this accomplished, the rest will follow.

THE AGRICULTURAL SOCIETIES OF NEW BRUNSWICK

THEIR ORIGIN AND HISTORY

By M. A. MACLEOD, Superintendent

WHEN New Brunswick ceased to be the country of Sunbury, Nova Scotia, and became a separate province, in 1783, there was no department for Agriculture or kindred organization to foster the development of her agricultural possibilities. For the next half a century, the annals of the province do not contain a great deal of information respecting the operations of organizations that came into being with the avowed purpose of developing the latent agricultural resources of the new province. Neither do the public accounts show any great provincial expenditure for this purpose.

The first agricultural society founded in New Brunswick was organized in the city of St. John, under the patronage of Governor Carleton, in the year 1790, and was composed of men ready to lead or second any effort to advance the agricultural interests of the province.

The Agricultural and Emigrant Society was organized in Fredericton in 1825, and it was due to the efforts of this society that New Brunswick acquired the honour of being the first province of Canada to import pure-bred cattle from Great Britain. This was made possible by grants given by the Provincial Government to the society in 1826. Subsequent live-stock importations were made until, in 1858, the grants for this purpose totalled upwards of £5,000. These importations laid the foundation from fifty to seventy-five years ago, of the best herds to be found here.

In the 1839 speech from the throne, the Lieutenant Governor, Sir John Harvey, said: "To the enlightened legislature of a country whose soil is eminently fertile and whose climate requires nothing but a system of agriculture properly adapted to it to ensure to the cultivator a certain and abundant return, it can scarcely be necessary to suggest the advantages of giving encouragement to agricultural pursuits. The mode by which this important object may be best effected, it will be for you to decide."

The committee to whom this portion of the address was referred reported: "That having had under consideration the several subjects re-

lating to this important subject we are of opinion that it would tend materially to advance the prosperity of the province if Agricultural Societies were founded in different and conveniently situated districts of the several counties for the purpose of encouraging, by their protection and influence and example, the general agricultural prosperity." With these views, the committee recommended that a suitable grant of money be made to His Excellency the Lieutenant Governor, such sum to be divided among and limited to the respective counties according to their relative importance for the purpose of encouraging the establishment of Agricultural Societies and promoting the objects thereof.

This report was negatived in 1839, but in 1840, Sir John in the speech from the throne said:—

"I feel that I ought not to refrain from again inviting your attention to those interests upon which the ultimate prosperity of New Brunswick appear to me to depend, in a far higher degree than either upon its timber or mineral treasures, valuable and apparently exhaustless as are the latter—I refer to those of agriculture."

The committee reiterated their report of the previous year, and it received the sanction of the Government. Thus, in 1840, began the systematic apportioning of annual grants to Agricultural Societies in New Brunswick. The sum of £100 was allotted to each county on the following basis:—

"Which sum, or aliquot portions thereof, shall be paid to the presidents of the respective societies already formed or that may be formed, when it shall be certified to His Excellency that the inhabitants of the several counties have subscribed and paid a sum equal to one-half the sum above mentioned, or to the said aliquot portions, which sums so paid shall be accounted for to the Legislature: Provided always that in such counties where District Agricultural Societies be founded, embracing one or more parishes only, it shall and may be lawful for His Excellency to apportion the amount so granted for the county among the said agricultural societies."

In 1843 the proviso was added "that no warrant do issue for such sums, or any part thereof, until an account current for the past year of the society for whose benefit such application may be made, duly attested by the treasurer, be first laid before His Excellency the Lieutenant-Governor or Administrator of the Government for the time being, to be laid before the Legislature at its next meeting. In 1856 the annual grant to Agricultural Societies was placed at £2,800 with not more than £200 to any one county. This amount has been augmented from time to time until now the annual grant has reached the $24,000 mark.

The first advance towards the establishment of a Department of Agriculture in New Brunswick was made in 1853, when an Agricultural Committee was appointed, consisting of one member for each county, to whom all matters relative to agricultural interests were referred.

With the granting to New Brunswick in 1855 of a full measure of responsible government, came, from time to time, changes that tended to the progressive development of agriculture in the province.

A Provincial Board of Agriculture was appointed in 1859. This board consisted of one man from each county, three members of the executive council and the professor of chemistry at King's College, any five to form a quorum. Their duties included the advising of the Government respecting any improvements that might be deemed advisable in the application of the grants to agricultural societies for objects likely to produce more permanent and advantageous results

to the agricultural interest of the province. The board also directed attention to the advantages which might result from the establishment of a Model Farm and an Agricultural School to which the youth of the country might resort for instruction in agricultural chemistry and the most approved modes of practical husbandry. The Board of Agriculture functioned until 1874, when a Secretary for Agriculture was appointed and its duties were transferred to the immediate supervision of the Government.

The Board was again reorganized in 1880, when it consisted of one member of the Executive Council, without salary, and six men appointed by the Governor in Council from the nominees of the officers of Agricultural Societies. After the reorganization of the Board, the office of Secretary of Agriculture was abolished. The Board functioned until 1888, when the present Agricultural Act, which makes provision for a Minister of Agriculture and a Deputy Minister or Secretary for Agriculture came in force.

The Agricultural Societies co-operated with the Board in the matter of establishing the Model Farm and in the importation of live stock, to the extent of remitting a portion of their annual grant to help along those projects. The Model Farm did not fulfil the expectations of its founders, and it has long since been dismantled. The vision was not, however, a myth. To-day experimental stations and demonstration farms are fulfilling the objects aimed at by these worthy men, and the Agricultural College at Truro, Nova Scotia, short courses, etc., are doing for our young men who wish to take advantage thereof, what the mooted schools of over sixty years ago claimed they would do. At the present time an agricultural school is being erected on the Experimental Station at Fredericton, New Brunswick, where it is hoped that many of the sons of members of our Agricultural Societies may gain some of the advantages sought for them in the early sixties by the Board of Agriculture. There the sons of our English, Scotch, Irish, French and Danish farmers may get together to study the trade of their fathers and cement for all time the friendship that prevails among all classes in this province without prejudice to race or creed. There, too, the traits of leadership will be developed, and each young man as he returns to his home district will be an added tower of strength to agricultural organization in his community.

New Brunswick Agricultural Societies have increased in number and influence until, at the present time, there are 152 societies in good standing, including a membership of upwards of nine thousand farmers, who subscribe in the vicinity of $14,500 annually. The minimum requirement to qualify for a charter and grant in any community is 25 members and subscriptions totalling $50. This standard must be annually maintained in order to qualify and keep in good standing from year to year.

The annual appropriation of $24,000 makes provision for the placing of *The Maritime Farmer*, the official organ of the Department of Agriculture, in the hands of every farmer when he becomes a member of the local Agricultural Society. The balance of the grant, approximately $19,000, is allotted to the societies on the basis of one-half of this amount divided equally among the societies. The remaining half is apportioned to each society at the rate of so many cents per dollar subscribed and paid into the treasury.

An Agricultural Society Division of the Department of Agriculture was created in 1913, and a Superintendent was put in charge thereof.

Among the activities of our Agricultural Societies are the improve-

ment of live stock, the co-operative handling of fertilizers, feeds, seeds, spraying materials, and other commodities, the sale of surplus live stock and crops, the holding of fairs, exhibitions and kindred competitions, and by no means the least, the development of active social life and the dissemination of agricultural knowledge through the medium of meetings, which are frequently visited and addressed by members of the staff of the Departments of Agriculture. There are fewer complaints of a lack of local leadership and of difficulty in maintaining interest in districts where frequent meetings to talk over their problems are held. It may be said, therefore, that the Agricultural Society is the medium through which the Departments of Agriculture get any organized effort in the interests of the rank and file of our farmers put into effect.

The most lasting good is being accomplished by the Societies that pay particular attention to the improvement of live stock through the introduction of pure bred sires, and in this they are assisted by generous bonuses given by the Provincial Department of Agriculture. Live stock improvement is paramount to any commercial venture, and the money thus judiciously expended gives better returns than where expended for exhibition purposes.

The first Provincial Exhibition was held in Fredericton in the year 1852. The next one was held in Sussex in 1861, and the third in Sackville in 1872. Since that time, fairs of a provincial or interprovincial nature have been annually held in several centres of the province, as well as a number of county and district fairs, the majority of which are held under the auspices of Agricultural Societies.

This resumé of the origin and partial history of New Brunswick Agricultural Societies would not be complete without making a passing reference to several provincial organizations that comprise many members of Agricultural Societies, and which have very materially helped to coordinate their province-wide endeavours.

The New Brunswick Farmers' and Dairymen's Association was organized in 1876. It comprises delegates from the various Agricultural Societies, who meet annually in convention to discuss matters relative to their industry and, as a farmers' parliament, advise the Government re legislation in which the farmers are generally interested.

The New Brunswick Fruit Growers' Association, organized in 1904, assists members of Agricultural Societies and other fruit growers in the co-operative purchase of spraying materials, shipping packages, trees, plants, etc., as well as in some of their marketing problems, and has in every respect proved a most useful organization.

The New Brunswick Agricultural Societies United, organized in 1914, combines the fertilizer buying powers of the members of all agricultural societies that purchase fertilizers co-operatively. The chemicals are purchased and mixed at home in formulae to suit, and thus a monetary saving is effected.

The New Brunswick Dairymen United, organized in 1919, comprises representative milk producers, milk dealers, dairy produce dealers, cheese factory owners, creamery owners, cheese makers and butter makers who conduct an annual convention and cheese and butter show in conjunction with the annual meeting of the New Brunswick Farmers' and Dairymen's Association. They also conduct a fortnightly cheese and butter board, which has more than justified its creation

A perusal of the minutes of Agricultural Society meetings, held in the forties and later, reveals the fact that some of the deliberations of that time were on subjects that are considered quite up-to-date nowadays. They reveal men of vision, intelligence and energy who had the good of future generations at heart. They were laying the foundation strongly and well, with a view to leaving a noble heritage to their children and their children's children. Our opportunities are better to-day. Let us make the best use of them.

The calibre of any agricultural society is no greater than that of the men that comprise its membership. The good accomplished by our agricultural societies in the respective communities varies according to the measure of energy and intelligence that the rank and file of the members exert for the common weal of the community.

PROVINCIAL AGRICULTURAL LEGISLATION, 1923

ONTARIO

Consolidated Cheese Factories Act.—Under this Act loans may be granted by the Minister of Agriculture, with the approval of the Lieutenant-Governor in Council, out of any moneys appropriated for the purpose by the Legislature from time to time towards the erection of consolidated cheese factories. Every loan shall be secured by a first mortgage on the lands upon which the factory is erected and in respect of which the loan is made. No amount in excess of 80 per cent of the value of the lands and buildings shall be loaned. The rate of interest is to be five per cent per annum. The application for a loan may be made by milk producers in any part of the Province of Ontario who desire to erect a modern dairy plant to take the place of two or more smaller ones and who have agreed to supply annually three million pounds of milk to the said dairy. The applicants shall form a co-operative company and subscribe for stock to the amount sufficient, in the opinion of the Minister, to finance the enterprise. Twenty per cent of the par value of such stock is to be paid at the time of subscription, and the balance deducted from the value of the milk delivered at the factory, at a rate not less than three per cent, nor more than five per cent, until the stock is fully paid up. The moneys received on account of stock are to be deposited in a trust fund, and shall at the end of each three months be paid over to the Minister of Agriculture, to be applied for the repayment of the moneys advanced. A shareholder cannot hold over five shares, nor have more than one vote. The site, plan and equipment of every factory in respect of which a loan is advanced under this Act is subject to the approval of the Minister, but the company manages the factory, provided the Minister has the right to name one director on the board, until such time as the loan is fully paid.

Agricultural Development Act Amendments.—The amount that may be loaned for the removal of encumbrances, which means mainly the discharge of mortgages, is increased from 40 per cent to 50 per cent.

It was also provided that loans may be granted to persons who had resided in Canada for three years, instead of Ontario for three years, as formerly. That a loan may be discharged in full at any time.

In the case of loans on properties of less than fifty acres, it is provided that the maximum valuation to be

recognized by the Boards shall be $300 an acre.

The purposes for which loans may be made are extended to include the purchase of breeding live stock, and the consolidation of outstanding liabilities incurred for productive agricultural purposes.

AGRICULTURAL APPROPRIATIONS

—	12 months ending October 31, 1923	12 months ending October 31, 1924
	$	$
Civil Government	111,150	112,125
Agricultural and Horticultural Societies	202,456	201,850
Live Stock Branch	129,200	133,200
Institutes	43,800	43,800
Dairy Branch	178,400	186,400
Fruit Branch	91,950	83,950
Agricultural Representatives Branch	167,000	192,000
Ontario Veterinary College	38,760	37,260
Western Ontario Experimental Farm	20,000	20,000
Miscellaneous	149,950	158,228
Ontario Agricultural College:		
Administration, maintenance and teaching	337,600	332,750
Macdonald Institute and Hall	57,822	57,822
Forestry	1,000	1,000
Animal Husbandry, Farm and Experimental Feeding Department	38,260	38,260
Field Experiments	21,910	21,910
Experimental Dairy Department	14,600	14,000
Dairy School	9,350	9,350
Poultry Department	26,133	26,133
Horticultural Department	28,800	29,750
Apicultural Department	14,050	11,050
Bacteriology	4,700	4,700
Botany	4,170	4,170
Chemistry	6,020	6,020
Entomology	5,150	5,150
English	1,340	1,340
Manual Training	3,550	3,550
Physics	16,020	16,020
Farm Economics	27,075	27,075
Total	1,750,216	1,778,863

QUEBEC

AGRICULTURAL LEGISLATION

The only important legislation relating to agriculture passed at the 1923 session of the Legislature of the Province of Quebec was an Act providing for the union of the three principal co-operative societies, namely, The Farmers' Central Co-operative, the Comptoir Co-operative of Montreal, and the Co-operative Society of Seed Producers of Quebec.

APPROPRIATIONS

—	1922-23	1923-24
	$	$
Agricultural Societies	100,000	100,000
Farmers' Clubs	65,000	65,000
Encouragement of agriculture in general including Demonstration Farms	350,000	500,000
Pomological and Fruit Growing Society	500	500
Council of Agriculture	3,000	3,000
Agricultural Schools	90,000	90,000
Veterinary Instruction		9,500
House-keeping Schools (Ecoles ménagères)	30,000	30,000
Dairy Association of the Province of Quebec	2,000	2,000
Dairy School of the Province of Quebec, St. Hyacinthe, and official Laboratory	25,000	25,000
Dairy Industry and inspection of factories for the manufacture of dairy products	130,000	135,000
Horticulture	25,000	25,000
Journal of Agriculture	27,000	27,000
Aviculture	15,000	15,000
Apiculture	10,000	15,000
Exhibitions	32,000	35,000
Civil Government—Salaries	55,533	62,350
Total	966,033	1,139,350

MANITOBA

AGRICULTURAL LEGISLATION

Bill 102 is enabling legislation giving "The Live Stock and Live Stock Products Act, 1917" (Canada), the same force of law in the Province of Manitoba as if it were a provincial Act.

Bill 103 is an Act to enable municipalities to borrow limited amounts of money for seed grain purposes, and prescribes the manner in which such moneys shall be borrowed. The amount is limited to $60,000 in any one municipality. This Act remains in force for six months, and makes provision that the Lieutenant-Governor-in-Council may guarantee any debentures issued by any municipality for the raising of funds to expend on procuring seed grain for farmers. It also provides that a separate and distinct seed grain account must be maintained by a municipality operating under this act. The amount to be loaned to any one individual is limited to $1,000 and no loan can be made to a tenant except with the consent of the owner. All by-laws passed by a council pursuant to the provisions of this Act shall, before becoming effective, be submitted to the Municipal Commissioner. Debentures issued under this Act for the purposes enumerated shall form no part of the general debt of the municipality. Nothing in this Act shall prevent any member of a council from applying for and receiving seed grain under the provisions of this Act. Promissory notes given to a municipality for seed grain supplied pursuant to this Act may, within thirty days of the making thereof be filed in the office of the clerk of the county court in the Judicial district in which the land on which the seed is to be sown is situated, and the municipality shall have a preferential lien upon that crop, and unless they make their collections from that crop the lien will operate against the land as an ordinary charge enjoying no precedence over prior charges.

APPROPRIATIONS

—	1921-22	1922-23
	$	$
Salaries, supplies and Expenses (Civil Government)	13,725	18,600
Agriculture	157,405	173,820
Manitoba Agricultural College	254,550	318,070
Agricultural Publications	16,525	20,700
Miscellaneous and Unforeseen	2,250	3,000
Birtle Demonstration Farm	4,250	5,120
Agricultural Survey	11,250	750
Marketing Investigation	1,000	1,000
Total	460,955	541,060

SASKATCHEWAN

AGRICULTURAL LEGISLATION

An Act to authorize the Acquisition and Management of Grazing Lands.—This Act gives authority to the Minister of Agriculture to acquire by lease from the Government of Canada such public lands of the Dominion suitable for grazing as may be deemed necessary, as well as authority to purchase or lease lands of private individuals adjacent thereto.

The minister is also given power to establish as a community grazing area any lands so acquired, and oc-

cupiers of land in any such community grazing district who become members of an agricultural co-operative association organized within such district will be entitled to obtain a lease granting to the association the use of such grazing area in accordance with certain provisions.

Such an association leasing such grazing area is given power to have a lien upon animals pastured thereon. Provision is made with respect to the sale of animals for indebtedness.

An Act to Amend the Agricultural Co-operative Associations Act.—Provision is made that where an association desires to do a credit business the required by-law shall be signed by three-fourths of the shareholders residing within a thirty-five mile radius of the head office. A similar stipulation applies to the winding-up of an association.

Any association registered under the Act is required to use the words "Co-operative Association, Limited," as part of its name.

An Act to amend the Game Act.—Provides for the shooting of ducks by farmers whose crops are being damaged.

An Act to amend The Noxious Weeds Act.—This amendment is designed to assist rural municipalities in the eradication of weeds on public highways. It provides that where the council of a municipality has passed a by-law under The Rural Municipality Act, such by-law shall be in force in such municipality notwithstanding anything contained in The Noxious Weeds Act. This by-law provides that every owner or occupant of any parcel of land of which the whole or a part is cultivated or under crop shall be responsible for the destruction of noxious weeds found between such land and the middle of the adjoining road allowance.

The time within which amounts not paid for work performed under the Act may be added to the assessment of the lands is changed from January 1 to December 31.

An Act respecting Stock Yards and Live Stock Exchanges.—To give the force of law within the provinces of Saskatchewan to The Live Stock and Live Stock Products Act (Canada).

The amendments to The Horse Breeders' Act and The Saskatchewan Co-operative Creameries Act are of minor importance.

AGRICULTURAL APPROPRIATIONS

—	1922-23	1923-24
	$	$
Administration	60,196	53,666
Assistance to General Agricultural Interests	117,000	119,200
Assistance to Dairy Industry	51,000	36,500
Assistance to Live Stock Industry	62,300	56,100
Publicity and Statistical Work	22,500	18,700
Improvement and Protection of Field Crops	41,500	38,000
Game Protection and Museum	35,300	44,800
Co-operation and Markets	22,000	20,000
Debt Adjustment Bureau	.....	11,300
Total	391,796	397,666

ALBERTA

AGRICULTURAL LEGISLATION

Agricultural Pests Act.—Provision is made for the supply of grasshopper poison bait free of charge to occupants of farm lands for the purpose of poisoning grasshoppers on roads, along irrigation ditches and upon waste or unoccupied parts of a town, city or village.

One half of the cost of poison bait ingredients, including freight to the distributing centre, will be charged to municipalities or residents of improvement districts.

The Community Grazing Act.—The province may accept from the Dominion Government leases of land for community grazing purposes. Notices of the availability of such leases shall be at once published in the Alberta Gazette giving a description of such area. Application for the use of this area for grazing purposes will be considered only when one-half of the residents of the district have signed a petition to the minister stating the number of stock they wish to graze. Upon receipt of such petition, the minister may declare the petitioners a community grazing association and shall appoint some person to call a meeting for the purpose of electing officers of the association. After organization, the minister may lease such area to the association upon terms to be agreed upon. The association may have a possessory lien upon all cattle grazing on such area for unpaid fees. The by-laws passed by the association shall be submitted to the minister for approval.

An Act was also passed respecting private grazing associations by which any ten farmers may petition the minister to incorporate them as a private grazing association.

An Act respecting Stock Yards.—An enabling Act to give force and effect of law to "The Live Stock and Live Stock Products Act, 1917" (Canada), in the province of Alberta.

The Mortgagees Seed Grain Security Act.—This Act provides that a mortgagee may advance seed grain or the purchase price of seed grain to a registered owner, mortgagor or the registered owner mortgagor and the purchaser of land under agreement of sale. The vendor of land who is also the registered owner may make a similar advance to the purchaser under an agreement of sale. Re-payment of amounts advanced may be secured by a seed grain lien. The amount advanced may be added to the principal sum due under mortgage or agreement of sale as the case may be and the amount of such lien shall be deemed to have formed part of the debt secured by the original mortgage or agreement of sale.

The Agricultural Societies Act.—The amendment to this Act reduces the amount to be paid in prizes, before earning a government grant, from $400 to $300, and provides a new schedule for computing the amount of the grant.

Stock Inspection Act.—Before driving stock from one point to another a distance of twenty miles or more within the province, or to a point beyond the province or to or from a forest reserve, notice must be sent to the Live Stock Commissioner or to the nearest police so as to be delivered prior to the movement of such stock. The person in charge of such stock must have in his possession a statement showing the brand, age, sex, and colour of the animals being driven.

No station agent shall accept stock for shipment which is not being shipped out of the province through Edmonton, Calgary, Moose Jaw or Winnipeg unless he has received a notice from the Live Stock Commissioner so to do or has a certificate from a stock inspector.

No person shall ship stock out of the province to or through Moose Jaw or Winnipeg unless he has sent to the Live Stock Commissioner the sum of ten cents per head for inspection, and no station agent shall accept for ship-

ment any stock out of the province to or through Moose Jaw or Winnipeg without proof of payment of the aforementioned fee.

Inspection and stamping of beef offered for sale in any city or town is no longer required.

The Domestic Animals Act.—Matters relating to stray animals, pounds, fences, entire animals, and sheep trailing are in unorganized districts retained under the control of the Minister of Agriculture, while in organized districts their administration is transferred to the jurisdiction of the Minister of Municipal Affairs.

APPROPRIATIONS

Agricultural Societies	$ 90,000 00
Official Judges and Extension	10,000 00
Production of Seed Grain	3,500 00
Live Stock Encouragement	20,000 00
Motion Picture Bureau	7,100 00
Stock Inspection	30,000 00
Brands recording	6,500 00
Stallion Act	5,000 00
Agricultural Statistics	5,400 00
Game protection	38,000 00
Promotion of Dairying	90,000 00
Schools of Agriculture—operation	84,450 00
School Fairs	7,500 00
Publicity	14,500 00
Poultry Industry	21,000 00
Women's Institutes	14,000 00
Miscellaneous grants	21,000 00
Agricultural Agents	25,000 00
Demonstration Farms—operation	30,400 00
Marketing	10,000 00
Registered seed grading and marketing	5,000 00
Miscellaneous	16,500 00
Total, chargeable to Income	$ 554,850 00
Total, chargeable to Capital	$ 632,270 00

NOVA SCOTIA

AGRICULTURAL APPROPRIATIONS

—	1922	1923
Current Account:		
Agricultural Societies	$ 20,000 00	$ 20,000 00
General Agriculture	49,441 66	50,000 00
College and Farm	44,309 79	42,073 32
Total	$ 113,751 45	$ 112,073 32
Capital Account:		
Agricultural College	$ 10,000 00	$ 13,900 00
Milk Collecting Station		2,700 00
Total	$ 10,000 00	$ 16,600 00

In addition to the foregoing, provision is made for an expenditure, not exceeding $25,000, for the encouragement of the production and use of ground limestone for agricultural purposes.

LEGISLATION

The following measures relating to agriculture were passed during the session of the Provincial Legislature for 1923:—

An Act Respecting Live Stock.—This enactment gives "The Live Stock and Live Stock Products Act, 1917" (Canada), and amendments and regulations, force of law in Nova Scotia. This Act legalizes work done by Dominion officials in Nova Scotia in respect to grading of live stock and various farm products.

An Act for the Encouragement of the Use of Ground Limestone for Agricultural Purposes in Nova Scotia.—Under the provision of this Act, a sum not exceeding $25,000 is appropriated to be used for assisting, by whatever means may be determined by the Lieutenant-Governor in Council, in making ground limestone more accessible to the farmers of Nova Scotia. Provision is made for possible assistance in either extending present limestone plants or the opening of new ones, for the prospecting for natural marl deposits, and in rendering them available. Temporary assistance in rebating freight on ground limestone up to an amount not exceeding one dollar per ton is authorized.

NEW BRUNSWICK

AGRICULTURAL LEGISLATION

Two measures of importance were passed at the 1923 session of the Legislature of New Brunswick. These are as follows:

The Farmers' Relief Act.—The Act empowers a municipality to borrow money for the purpose of lending same to farmers in such munici-

pality. The sum to be borrowed may not exceed 50 per cent of the total valuation of the real estate in the municipality and is repayable annually at 5 per cent interest.

The municipality availing itself of the provisions of the Act is required to appoint a Farm Loans Board, consisting of three persons, to whom are delegated all powers and duties arising out of the Act.

Loans are to be secured by first mortgage on farm land situated within the municipality, and are to be repaid on an amortization plan of not more than thirty equal annual instalments at a rate of interest sufficient to pay the interest on the sum borrowed by the municipality but in no case to exceed six per cent.

The purpose for which loans may be made are as follows:

(*a*) To discharge liabilities incurred for the improvement and development of land used for agricultural purposes, and any purpose calculated to increase land productiveness;

(*b*) To acquire land for agricultural purposes and the satisfaction of encumbrances on land used for such purposes;

(*c*) To clear and drain land for agricultural purposes;

(*d*) To erect farm buildings;

(*e*) To purchase live stock and implements.

Addition to the Dairy Industry Act.—Contains provisions for the testing for butter fat of milk and cream supplied to dairy factories; the retaining of samples; the keeping of daily records of tests, amounts of milk or cream received; the weight of butter and cheese manufactured and of the disposal of same; and gives patrons and official inspectors access to said records. Inspectors are empowered to take samples for testing, either at the farm or elsewhere, and to re-test samples. Where a re-test is demanded, the inspector's test shall be final, and shall determine the rate of payment.

APPROPRIATIONS

The appropriations for the New Brunswick Department of Agriculture are as follows:—

——	1922	1923
General	$ 71,250 00	$ 78,150 00
Exhibitions	18,000 00	18,000 00
Total	$ 89,250 00	$ 96,150 00

BRITISH COLUMBIA

AGRICULTURAL LEGISLATION, 1922

An Act to amend the Pound District Act.—Where payment is made out of the Consolidated Revenue Fund to a pound-keeper pursuant to this Act for fees or expenses incurred in respect of any impounded animal, the Minister of Finance may recover the amount so paid from the owner of the impounded animal by action in any court as for a debt due to the Crown.

An Act to provide for the Control of the Codling Moth.—In response to a call for further help by orchardists in the Okanagan Valley in connection with the control of codling moth, which in spite of ordinary control measures was showing a tendency to increase, the Government of the Province decided to effect legislation which would enable a special sum of money not exceeding $20,000 in any one year to be provided in addition to other votes for the extermination of this pest. The Act gives authority for employees of the Department to enter upon any lands, without the consent of the owner, within a district that has been proclaimed a codling moth control area. The expenditures of all such special sums advanced is under the control of the Department of Agriculture, and in connection with the repayment of

such sums, the Act gives authority for the assessing and levying of a tax on all fruit lands within such areas. The valuation of the fruit trees is determined by the Provincial Assessor who makes a fair apportionment.

Provision is also made for cases where a codling moth area comes within a municipal district or where lands are owned by a municipal corporation.

An Act to amend the Co-operative Associations Act.—A number of alterations were made to the various clauses of the Act, which was passed in 1920, the most important being the following:—

Clubs.—Where an association has been formed for the purposes of a club, evidence may be required that such club has been carried on in a proper manner for at least one year immediately preceding the application for incorporation.

Apportionment of Profits.—In addition to the provisions in the main Act relating to setting aside not less than ten per cent of the profits as a reserve fund and the payment of dividends not exceeding eight per cent, the following clause was made effective:—

"(*c*) By distributing among such patrons or such class or classes of its patrons as the association may, subject to its rules, determine, whether members or not, and whether vendors to or purchasers from the association, the whole or any portion of its remaining profits."

Enforcement of Contracts.—The following important amendment to the Act was passed owing to representations made by the fruit growing industry:—

"19A. Where a person enters or has entered into a contract with an association to deliver to or sell through the association any agricultural or manufactured product grown or made by him, or on his behalf, or in which he has an interest, such person being one of a number of persons with whom the association makes or has made contracts of like nature, any such contract may be enforced by an order for specific performance."

An Act to amend the Societies Act.—The Societies Act, passed in 1920, is the Act under which all Farmers' and Women's Institutes, Agricultural Associations and, in general, non-share capital associations are incorporated. A number of minor amendments were passed clearing up points in connection with the procedure of incorporation of associations under the Act.

An Act to amend The Trespass Act.—Clause 3, giving definitions of a legal fence, is amended by provision being made for Orders in Council to be passed suspending the operation of the various definitions of a legal fence in unorganized territory in that portion of the Fort George electoral district lying east of the summit of the Rocky Mountains. Provision is also made for what shall constitute a lawful fence for any purpose within the said area.

AGRICULTURAL APPROPRIATIONS

—	1922-23	1923-24
Minister's Office	$ 13,190 00	$ 13,190 00
General Office	38,176 00	37,426 00
Horticultural Branch	104,712 00	115,762 00
Live Stock Branch	67,472 00	84,992 00
Statistics	4,520 00	4,320 00
District Agriculturists, etc	16,270 00	.....
Workshop and Shipping Office	3,180 00	3,180 00
Miscellaneous Grants, etc	132,150 00	124,500 00
Total	$ 379,670 00	$ 383,370 00

PART III

Agricultural Education and Related Activities

HIGH SCHOOL AGRICULTURE IN ALBERTA

By G. V. VAN TAUSK, M.A., B.Sc., (Ag. Ed.)

The Past

THE development of Agriculture as a school subject in both the Elementary and High Schools is described in an article by the author on page 145 of Volume X, No. 2, (March-April, 1923), of The Agricultural Gazette.

From the inception of the Province until 1915, agriculture was taught more or less in connection with Botany and as a text-book subject. A new course in High School Agriculture was introduced in 1915. This course, with little change, is still in effect. It contained the following topics:—

1. Soil—origin and physics;
2. Elementary Soil Chemistry;
3. Preparation of Seed Bed;
4. Plant Propagation;
5. Bacteria as Related to Soil;
6. Weeds;
7. Seeds;
8. Plot Work;
9. The economic Value of Plants;
10. Birds, Insects, etc.;
11. Animal Husbandry.

Judging from the following Inspectors' reports, this new course did little or nothing towards improving the work in High School Agriculture.

(1) "The teaching of Agriculture is not very effective, due to lack of experimental work. A properly organized course in Secondary Agriculture should be primarily and fundamentally a series of laboratory and field experiments around which recitations, lectures and reading will centre as supplementary work. In the majority of the schools visited very little laboratory or field work was attempted."

(2) "A differentiation in the content of the course in Agriculture for urban and rural schools might be made. At present the work in this subject in the city schools is quite theoretical, while in the rural schools, through lack of time, this phase of the work is not emphasized and given the helpful practical turn of which it is capable. To do this subject justice, instruction should be given by persons with special qualifications."

The Present

Agriculture is being taught as a science option in the third year of the High School course, and in most instances is merely a matter of memorizing notes or book material. This is due to the following factors:—

(*a*) Lack of teachers with special Agricultural training;

(*b*) The subject being new has not been organized like the older sciences;

(*c*) Lack of sympathy on the part of school officials and authorities;

(d) Lack of understanding of the fact that Agriculture is not only a science, but also an art, business and mode of living, and that all these are so closely related that for the purpose of instruction they have to be considered one whole.

(1) High School Inspector J. A. Smith, in Report of Dept. of Education, Alberta, for 1919, Page 17.

(2) High School Inspector G. A. McKee, in Report of Dept. of Education, Alberta, for 1920, Page 25.

It was pointed out at the 1922 Convention of the Canadian Society of Technical Agriculturists, that Alberta is the last of the provinces in regard to School Agriculture. The explanation is: that in Alberta no appropriation is made from the "Agricultural Instruction Act" or from provincial funds towards furthering Agriculture as a school subject, and also that this is the only province in the Dominion that has no Governmental Branch, or at least an official, in charge of Rural Science or School Agriculture.

The Future

A new course of study for the High Schools is in preparation. The following courses are being outlined, viz:—Normal Entrance, Matriculation, Agricultural, Commercial, Technical and General.

Agriculture is an optional science subject in the Normal Entrance, Matriculation (not definitely decided), and General Courses. It is obligatory in the Agricultural Course.

"Agriculture is to be offered for two years. The courses in Agriculture are inter-related in such a way that the student who selects the first year of Agriculture (offered in the second year of the High School course) must select the second course in the following year. Project work is to be undertaken in the spring at the end of the first year, and it is provided that a portion of the work of the following autumn will be based on the results obtained in these projects." In the first year of the course the scientific principles underlying agricultural practice and some related botany, entomology, and soil physics are treated. The second year's work is pre-eminently an application of the above to agricultural practice and animal husbandry.

The aim of the teaching of Agriculture in Alberta High Schools is:

(1) To teach a subject with the same purpose and end in view as Physics and Chemistry;

(2) To develop in the pupil an interest and intelligent appreciation of Canada's primary industry;

(3) To teach the student through the subject matter and the method of instruction of the course in Agriculture the three main functions of Secondary Education,—

*(*a*) "To prepare the individual for efficient participation in the duties of social, civil, political, and family life;

(*b*) "To prepare the student to become an efficient, economic factor;

(*c*) "To prepare the student for the activities whose primary purposes are personal development and personal happiness through the correct use of his leisure time."

*From the Second Interim Report of the Committee on High School Education, Edmonton, March 1, 1923.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications and Notes

THE LATE JOHN G. RUTHERFORD

DR. J. G. RUTHERFORD, C.M.G., D.V.S., member of the Board of Railway Commissioners for Canada, and formerly Veterinary Director-General and Live Stock Commissioner, died suddenly at St. Luke's Hospital, Ottawa, on July 24, in his 66th year.

Dr. Rutherford was exceptionally well informed on Canadian agricultural matters, and on the live stock industry in particular, and his contribution to the betterment of cattle and horse breeding in Canada was outstanding. He was virtually the author of the Grain Act, and while in Parliament, from 1897 to 1900, was prominent in advocating the instituting of a Dominion Board of Railway Commissioners.

John Gunion Rutherford, C.M.G., V.S., H.A.R.C.V.S., was born at Mountain Cross, Peebleshire, Scotland, on Christmas Day, 1857, the son of Rev. Robert Rutherford, M.S., a prominent minister of the Scottish church. He migrated to Canada at the age of 17, and attended the Ontario Agricultural College, Guelph, being one of the earliest students at that institution.

In 1879, he was graduated from the Ontario Veterinary College and was the winner of the gold class medal. Following his graduation, he practised his profession with success for many years at various places in Canada, the United States and Mexico. In 1884, Dr. Rutherford settled at Portage la Prairie, Manitoba, where he engaged in veterinary practice and specialized in horse breeding and live stock.

His first appointment to public office came in 1884, when he was made provincial veterinary inspector for Manitoba. He resigned from this office in 1892 to enter politics and successfully contested Lakeside (Portage Plains) for the Manitoba Legislature. After serving four years in the Legislature he decided to enter the Federal arena, and was returned in a by-election in Macdonald, 1897. The riding then comprised more than one-sixth of Manitoba.

After acting as special quarantine officer for the Federal Department of Agriculture in Great Britain during 1901, Dr. Rutherford was, the following year, appointed chief veterinary inspector.

In 1904, he organized the Health of Animals Branch, becoming Veterinary Director-General. In 1906, he was made Dominion Live Stock Commissioner. He held both offices until 1912, and during his tenure the work of two branches was brought into close correlation.

While Dr. Rutherford was in office, many original and radical departures were made in connection with the control and eradication of contagious diseases among the live stock of the Dominion, one of the most important of these being the creation of a Pathological Division and the establishment of a Biological Laboratory.

In recognition of his services to Canada and the Empire, Dr. Rutherford was in 1910 created a C.M.G.

Upon leaving the Government service in 1912 he undertook a campaign for the encouragement of mixed farming and the development of the live stock industry in the Western Provinces, under the auspices of the Canadian Pacific Railway.

From 1913 to 1919, Dr. Rutherford served as president of the Western Canada Live Stock Union, one of the largest organizations in Canada interested in production of live stock.

He represented Canada at the International Institute of Agriculture held at Rome and the International Congress on Tuberculosis at Washington, D.C., in 1908. He was president of the American Veterinary Medical Association from 1908 to 1911, and chairman of the International Commission on the Control of Bovine Tuberculosis.

Dr. Rutherford was largely instrumental in bringing about far-reaching improvement in veterinary education in Canada.

Among the many posts Dr. Rutherford held was that of Chairman of the Reindeer Commission. He made a report to the Canadian Government on the commercial possibilities of reindeer raising and the marketing of the meat.

Dr. Rutherford did some extensive farming on his own account, his farm being situated in the Chilliwack Valley, British Columbia.

REGULATIONS FOR THE GRADING AND MARKING OF EGGS EXTENDED TO DOMESTIC TRADE

THE Federal regulations regarding the grading and marking of eggs, which came into effect on July 7, 1923, provide that all eggs for domestic consumption in Canada shall be graded and classified according to the Canadian Standards, and that every case or container of eggs for sale must be marked on both ends with the name and class of eggs contained therein. This provision applied previously only to import, export and interprovincial trade.

The main provisions of the new regulations are as follows:—

4. Every case or container of eggs that is shipped or delivered by persons who receive eggs on consignment or buy eggs for re-sale shall be marked, labelled or tagged in conspicuous letters on both ends with the name of the class and grade of the eggs contained therein, according to the Canadian Standards, providing that any producer or other person dealing in eggs may delegate his right to candle and grade to the first wholesaler or retail dealer to whom the eggs are shipped or delivered, in which case the markings, labellings or taggings shall consist of the words "Ungraded Eggs for Shipment Only," and provided that the provisions of this regulation shall not apply to shipments or deliveries direct from producer to consumer. When cartons are packed in cases or other containers, both cases and cartons shall be marked, labelled or tagged as aforesaid.

5. Every case or container of eggs that is exposed, displayed or offered for sale by any person selling or delivering eggs direct to consumers in a public place or manner shall be marked, labelled, tagged or accompanied in conspicuous letters with the name of the class and grade of eggs contained therein.

6. Cases or containers of eggs marked with the name of the class and grade shall be considered to be properly marked when they contain not more than an average of six and one-half (6½) per cent below grade stated apart from breakage. Com-

plaints to vendors, with respect to eggs below grade, shall be made to the vendor within 24 hours of the receipt of such eggs. After the expiration of the said 24 hours the liability as to eggs below grade stated shall be upon the person in whose possession such eggs are found.

7. Every person who sells, offers or displays eggs for sale as a retailer shall cause to be displayed in a prominent place in his place of business a card as may be prescribed setting forth classes and grades of eggs as defined by the Canadian standards.

8. No person shall ship eggs or cause eggs to be shipped or delivered or displayed for sale in cases or containers which are marked or labelled or tagged with the name of any class or grade specified in these Regulations unless the quality and weight of the eggs contained therein is equal to or better than such class and grade.

9. No person shall buy for sale or re-sale, or expose, offer for sale, or sell eggs which are unfit for human food.

10. (1) All persons who receive eggs on consignment or buy eggs for re-sale, in making payment for same, shall apportion the returns on the basis of Canadian standard grades accompanied by a statement on forms as required in schedule "A" to these Regulations, provided that this Regulation shall not apply where producers market their eggs in less than fifteen dozen lots in any one day.

(2) A consignee of ungraded eggs transferring the same to another party for candling and grading shall make the transfer within 48 hours from the time the eggs are delivered to the consignee.

(3) The Minister, or his representative, may require to be notified in the case of a transfer for the purpose of candling and grading as mentioned in the next preceding subsection, and may prescribe the conditions under which such transfers may be made.

11. Any inspector charged with the enforcement of these regulations may enter any premises or conveyance to make examination of any case or container of eggs suspected of being improperly or falsely marked in violation of the provisions of these Regulations or to ascertain the manner and extent to which the returns for eggs have been apportioned in accordance with the Canadian standards as required in regulation 10 of these regulations.

AMENDMENTS TO THE REGULATIONS UNDER THE DESTRUCTIVE INSECT AND PEST ACT

Amendment No. 19 (No. 2 of 1923)

By Order in Council passed on May 31, 1923 (P.C. 999), the amendment dealing with the European Corn Borer passed on March 21, 1922, under subsection (*h*) of section 7 of the Regulations was rescinded and the following substituted therefor:—

Section 7.—The importation into Canada of the following is prohibited:—

(*h*) Corn and broom corn (including all parts of the plant), all sorghums, sudan grass, cut flowers or entire plants of chrysanthemum, aster, cosmos, zinnia, hollyhock, and cut flowers or entire plants of gladiolus and dahlia except the bulbs thereof without stems, oat and rye straw as such or when used for packing, celery, green beans in the pod, beets with tops, spinach, and rhubarb,

from the following counties in eight states of the United States of America:—

Maine:—Cumberland and York counties;

Massachusetts:—Barnstable, Bristol, Essex, Middlesex, Norfolk, Plymouth, Suffolk and Worchester counties;

Michigan:—Munroe and Wayne counties;

New Hampshire:—Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham and Strafford counties;

New York (Eastern):—Albany, Fulton, Greene, Hamilton, Montgomery, Otsego, Renssalaer, Saratoga, Schenectady, Scoharie, Warren and Washington counties;

New York (Western):—Cattaragus, Chautauqua, Erie, Genesee, Niagara and Wyoming counties;

Ohio:—Ashtabula, Cayahoga, Erie, Geauga, Lake Lorain, Lucas, Ottawa, Sandusky and Wood counties;

Pennsylvania:—Crawford and Erie counties;

Rhode Island:—Bristol, Newport and Providence counties;

unless the same are accompanied by a certificate of inspection issued by an authorized officer of the United States Department of Agriculture, which states that the shipment is free from infestation by the European Corn Borer.

This prohibition does not apply to the plants enumerated when they shall have been manufactured or processed in such a manner as to eliminate all risk of carriage of the European Corn Borer, nor to cleaned shelled corn nor to cleaned seed of broom corn.

Amendment No. 20 (No. 3 of 1923)

By Order in Council dated June 4, 1923 (P.C. 1000), the amendment to the Regulations dealing with the importation of certain species of Berberis, passed on April 19, 1919, as subsection (*g*) of section 7 of the Regulations was rescinded and the following substituted therefor:—

Section 7.—The importation into Canada of the following is prohibited:—

(*g*) European Buckthorn *(Rhamnus cathartica L.)* and common or Rust Barberry *(Berberis Vulgaris L.)* and their hybrids and horticultural varieties: all species and varieties of *Berberis* and *Odostemon (Mahonia)* susceptible to Crown Rust of Oats and Black-stem Rust of Wheat respectively: including:—

B. Amurensis Rupr.
B. Canadensis Pursh.
B. Lycium Royle.
B. Sibirica Pall.
B. aristata D.C.
B. ilicifolia Forst.
B. Nepalensis Spreng.
O. Aquilfolium Rydb."

The only change in this regulation is that European Buckthorn *(Rhamnus cathartica L.)* has been added to the list of plants prohibited entry on account of its being a host of the disease causing Crown Rust of Oats.

Amendment No. 21 (No. 4 of 1923)

By Order in Council dated June 4, 1923 (P.C. 1001), the amendment dealing with the importation into the Prairie Provinces and eradication therein of certain species of *Berberis*, passed on April 19, 1919 as subsection (*a*) of section 12 of the Regulations, was rescinded and the following substituted therefor:—

(*a*) European Buckthorn *(Rhamnus cathartica L.)* and the following species, hybrids and horticultural

varieties of the genera *Berberis* and *Odostemon* (Mahonia), including:—

B. Vulgaris L.
B. Amurensis Rupr.
B. Canadensis Pursh.
B. Lycium Royle.
B. Sibirica Pall.
B. aristata D.C.
B. ilicifolia Forst.
B. Nepalensis Spreng.
O. Aquifolium Rydb.

constituting an obstacle to the successful control of Crown Rust of Oats and Black stem Rust of Wheat respectively, shall, therefore, be prohibited from being moved from any area outside to any area within the Provinces of Manitoba, Saskatchewan and Alberta, throughout which provinces they shall be exterminated without any claim for compensation."

The only change in this Regulation is the addition of European Buckthorn *(Rhamnus cathartica L.)* which constitutes an obstacle to the successful control of Crown Rust of Oats.

THE POWDERED MILK INDUSTRY

By B. A. GOULD, President, Canadian Milk Products, Limited

THE first commercial manufacture of milk powder in Canada was at Brownsville, Ontario, in the spring of 1904. The process used was the hot roller process, which is now becoming somewhat obsolete. The product was entirely unknown and lacked some of the valuable qualities of modern process powders, such as complete solubility, etc. The growth of the use of milk powder in Canada was therefore very gradual, and a small production was all that could be successfully marketed.

The first modern spray-process powder was also made at Brownsville in 1909, when the original plant was remodelled for this purpose. The advantages of the powder produced by this process were such that its use has grown rapidly. To-day there are ten producing plants in Canada making powdered milk of various kinds. The greater part is skimmed milk powder; but there are also considerable amounts of whole milk powder and of cream powder manufactured, as well as special kinds of powder, such as modified milk powder, protein milk powder, and ice cream powder. It is estimated that, during the current year, more than one hundred million pounds of Canadian milk will be marketed in the form of powder.

The future of the industry in Canada is very bright, but only those manufacturers who have up-to-date methods and assured capital, as well as good selling organizations, are likely to succeed. A great deal of work must still be done to get the milk produced on the farms of the quality necessary to yield a first-class product. It is not enough to have modern sanitary equipment at the manufacturing plants, but the equipment and the methods of the producing farms must also be up-to-date or the product will not be of the highest quality. Much harm has been done to the industry by the marketing of inferior powdered milk, and it is only by expensive experience that buyers have learned that milk powders of the same chemical analysis may nevertheless vary greatly in value.

This industry will become one of rapidly growing value to Canada if the manufacturers are able to keep the quality of their product second to none. The home market is capable of further development, and foreign markets are open for the right kind of powder.

EXPORT PROSPECTS FOR CANADIAN REGISTERED SEED

A recent development in connection with Canada's export seed trade is the shipment to Argentina of 500 bushels of Registered Marquis wheat. This wheat was the product of Saskatchewan members of the Canadian Seed Growers' Association, and the shipment was the first of its kind to go to South America in commercial quantity. The results will be observed by the representatives of the Commercial Intelligence Service of the Department of Trade and Commerce, and should the performance of the seed prove to be satisfactory, further purchases from Canada may be looked for.

On account of Canada's northern latitude and rigorous climatic conditions, combined with immense tracts of rich virgin soil, Canadian-grown seed of any given kind or variety, when planted in southern latitudes, is known to yield a bigger crop of better quality than does seed of the same kind or variety produced in a southern latitude. Of recent years this fact has been taken advantage of by potato growers in the South Atlantic States. These growers usually obtain a large portion of their seed potatoes from New Brunswick and Prince Edward Island. Similarly, grain growers and seed firms from the south of the Canadian boundary look to the prairie provinces of Canada for much of their high-class seed grain supply.

Productivity, purity and vitality are the essentials of good seed. To guarantee these qualities in the seed produced by its membership, is the work of the Canadian Seed Growers' Association, an organization which for twenty years has been engaged in educational and control work. Through this organization, promising strains of various kinds have been pedigreed, multiplied, and kept pure. Only varieties of proved merit are accepted for registration, seed fields are carefully inspected, and the product, after being tested for purity and germination, is graded, marked and sealed at the grower's premises or at a central cleaning plant. In addition, the kind, quality and source of eligible seed stock is recorded each year, so that information is always available as to where supplies may be obtained.

By these means the Association is doing work that is vital to the interest of Canadian agriculture, and the promising export business which is apparently developing will be greatly assisted. Arrangements are now being made, according to the Secretary, Mr. P. Stewart, of Ottawa, for greater volume of production of seed grain in the Canadian West, in order to meet home requirements and foreign demand for seed of this class.

A NEW SOURCE OF CLOVER SEED

AT a meeting of representatives of the Dominion Department of Agriculture, the Canadian Seed Growers' Association and of the Ontario Department of Agriculture, recently held at Oxdrift in the Dryden District of Northern Ontario, a plan was formulated for a system of inspection and scoring of clover seed fields this season. The meeting was called by the Co-operative Association of Seed Growers at Oxdrift, an organization consisting of seventy active members. This association cleaned and sold for Canadian consumption upwards of $30,000 of clover seed last year.

Selected fields of clover seed growers in the Dryden District will be inspected and scored on the basis of:

(*a*) Origin and apparent hardiness of seed planted;
(*b*) Hay yielding capacity;
(*c*) Seed yielding capacity;
(*d*) Freedom from disease, impurities and weeds.

The seed of approved stock will be kept separate and placed on the market under the seal and certificate of the Canadian Seed Growers' Association. This move, it is expected, will provide a promising field for the seed growers in New Ontario, as well as valuable assistance to farmers who wish to purchase native-grown clover seed of the highest grade. The possibilities of development in clover seed production are seen in the fact that tremendous quantities of clover seed are imported into Canada each year. The importation for the past fiscal year amounted to 8,393,470 pounds, valued at one and three-quarter millions of dollars. Like all other northern-grown seed, the New Ontario clover seed produces infinitely better results on Canadian farms than seed imported from warmer climates.

NEWS ITEMS AND NOTES

The Hon. John S. Martin, B.A., South Norfolk, Minister of Agriculture for the province of Ontario in the Ferguson government, owns and operates a 200 acre farm near Port Dover, and has achieved a wide reputation as a breeder and exhibitor of White Wyandotte fowls. After graduating from the University of Toronto, he was a high school principal for a number of years. Mr. Martin has been prominent in municipal affairs.

The Agricultural Representative is one of the chief connecting links between departments charged with the development of scientific agriculture and the farmer. He acts as a resident agent, studying local requirements and transmitting information on approved agricultural practices ascertained by means of experimental work. As a promotion agent he is especially useful. This has been demonstrated by his work, not only among the adult farm population, but also among adolescents through the medium of school fairs, boys' and girls' clubs, classes of instruction for farm boys, stock-judging teams, and competitions of various kinds.

At the sixteenth annual convention of the Agricultural Representatives of the Ontario Department of Agriculture held at the Ontario Agricultural College in June last there was an attendance of fifty representatives and ten assistants. All phases of agricultural extension work were discussed, as well as matters relating to the general activities of the representatives. The College professors, representatives from the Ontario and Dominion Departments of Agriculture, and several leaders in the extension work of the United States, took part in the proceedings. R. S. Duncan, Director of Agricultural Representatives was the general chairman, and was assisted by W. D. Jackson, Assistant Director. The convention lasted for over three days.

At the 1923 conference of Ontario Agricultural Representatives, Mr. H. H. Dean, Professor of Dairying at the Ontario Agricultural College, stated that his department had definitely proved that milk rich in butter-fat produces more and better cheese than low-testing milk. Milk testing 3·7 per cent fat, for example, produced 11 pounds more cheese per 1,000 pounds of milk than milk testing 3·2 per cent.

In order to introduce the methods so successfully used in British Columbia for the packing of fruits for long distance shipments, the Fruit Branch of the Dominion Department of Agriculture has arranged to bring an expert packer from British Columbia to Ontario. Demonstrations in the packing of fruit in western packages are being given throughout the tender fruit sections of the province.

It will be of special interest to French readers to know that Rev. Fr. Wilfrid, superintendent of the Poultry Division at the Oka Agricultural Institute, has published a third edition (completely revised) of his bulletin on poultry-keeping. This bulletin, No. 4, is entitled "Twenty Years of Practice and Experiment With Poultry;" it comprises 175 pages, contains many illustrations, and also four coloured cuts showing

how to tell good layers from poor ones. Prepared with the utmost care and its printing being all that could be desired, this bulletin—the result of 20 years' work—will no doubt be welcomed as a recognized guide for all those engaged in poultry work in the province of Quebec. It is distributed free of charge by the Publications Branch of the Quebec Department of Agriculture.

Mr. A. H. White, B.S.A. (Guelph, 1917), Senior Dairy Promoter, Dominion Dairy and Cold Storage Branch, has received a Master of Science degree from the Iowa State Agricultural College at Ames. Mr. White, who took a nine months' post graduate course in dairy manufacturing, was successful in securing one of the four teaching fellowships in dairying offered each year at that institution. Seven Canadians took post graduate work at Ames during last year in dairying and animal husbandry, including Professor Wade Toole, of the Ontario Agricultural College, Guelph, who received his master's degree in March. There were also a number of South African students in attendance, taking either graduate or undergraduate work. The South African Government, Mr. White states, grants financial assistance amounting to about $1,000 a year to such students, subject to their remaining in the government service for three years on their return.

The professor of poultry husbandry of the Manitoba Agricultural College, Mr. M. C. Herner, has issued a statement as to the results obtained recently in the culling of poor layers in farm flocks of chickens in that province. In many flocks nearly half of the hens have been culled out, and the good ones left laid almost as many eggs as the whole flock laid before culling. In one district 13 flocks were culled, comprising 846 hens, of these 374 were eliminated, and the 472 remaining laid 1,378 eggs in 7 days after culling, as compared with 1,456 from the whole flock in the week previous to culling.

The fifth of the egg laying contests conducted by the Dominion Experimental Farms begins on November 1, 1923. The contests will be conducted as usual at the Central Experimental Farm, Ottawa, and at one experimental farm or station in each of the provinces, and run for 52 consecutive weeks. Birds qualifying are eligible for registration in the Canadian National Poultry Record.

The organization recently of a seed-grain cleaning, grading and marketing service by the Alberta Department of Agriculture is showing important results. Its cleaning plant, which is equipped with machinery of the latest type, was operated during part of last season. A reasonable price was quoted for the seed, and the demand for it was good. The undertaking will doubtless promote and encourage the development of pure seed growing in the province.

Because of a decrease in attendance, the Alberta Department of Agriculture will close for the time being four of the six Alberta Schools of Agriculture. The Schools at Olds and Claresholm will be continued.

According to figures supplied by the Dominion Bureau of Statistics, the production of commercial apples in Canada was 3,334,660 barrels in 1919, 3,404,340 in 1920 and 4,046,813 in 1921.

The exports were as follows:—

——	Quantity	Value
	Brls.	$
1919-20	873,882	4,242,219
1920-21	1,358,499	8,299,099
1921-22	1,845,955	8,854,379
1922-23	1,460,656	6,450,044

The principal countries importing Canadian apples are the United Kingdom, the United States and Newfoundland. Small quantities are exported to a surprisingly large number of other countries, including New Zealand, Cuba, the West Indies, Central and South American countries, South Africa, and even China.

In 1922-23 the United Kingdom took 1,325,658 barrels, compared with 1,523,901 in 1909-10, indicating that exports to that country are steadily approaching pre-war levels. The United States received 71,744 barrels in 1922-23 compared with 48,272 barrels in 1910.

Dr. J. H. Grisdale, Deputy Minister of Agriculture, and Mr. Duncan Marshall, Commissioner of Agriculture, will form part of the Canadian delegation to the Imperial Economic Conference in London in October, where the various problems arising from the removal of the cattle embargo are expected to come up for discussion. The matters to be discussed will include the regulations in regard to store cattle and also the admission of breeding animals.

Arrangements have been completed for a government exhibit of fruit at the Imperial Fruit Show to be held in Manchester, England, during the week commencing October 26. Canada is to be represented on the board of judges, which will consist of three, one from Great Britain, one from Canada, and a neutral judge.

APPOINTMENTS AND STAFF CHANGES

Mr. Lionel Stevenson, who has been Secretary and Supervising Director of the Ontario Department of Agriculture for the past two or three years, with headquarters at Toronto, has been appointed Director of Extension, Ontario Agricultural College, with headquarters at Guelph.

Mr. Stevenson's work will include the supervision of the outside activities of the officers of the College and of the Department, with the object of increasing their usefulness to the farmers.

J. A. Neilson, B.S.A., M.S., until recently lecturer in horticulture at the Ontario Agricultural College, has been appointed to the Horticultural Experiment Station staff at Vineland in the capacity of extension horticulturist.

Mr. William Alfred Maw, B.S.A., has been appointed to succeed Dr. M. A. Jull as Manager and Lecturer in the Poultry Department, Macdonald College. Mr. Maw received his B.S.A. from McGill University on May 28, 1920, having specialized in poultry husbandry. He took post-graduate work at Cornell last year.

ASSOCIATIONS AND SOCIETIES

Canadian Society of Technical Agriculturists.—The Canadian Society of Technical Agriculturists held its third annual convention at the University of Saskatchewan, Saskatoon, in June, 1923. A report of the proceedings is published in the Society's journal, *Scientific Agriculture.*

Resolutions were passed recommending (1) That the Dominion government enact at the next session of Parliament such legislation as will ensure to the Provinces continued and generous financial support towards the furtherance of agricultural instruction; (2) That the Federal and Provincial governments provide additional facilities for research in veterinary medicine.

The Society conferred a Fellowship upon Dr. James W. Robertson, of Ottawa, for professional distinction.

The committee on Graduate Scholarships recommended that the scholarship donated by the society for post-graduate work, be awarded to Mr. W. F. Hanna, B.A., B.Sc.A., M.Sc. Mr. Hanna will take graduate work in plant mycology and physiology at the University of Manitoba.

It was agreed to hold the 1924 convention at the Ontario Agricultural College, Guelph, The society's officers for 1923-24 were published in the previous issue of The Agricultural Gazette.

Alberta Co-operative League.—President, A. Litt, Bentley; Vice-president, F. Freeman, Wetaskiwin; Secretary, A. P. Moan, Wetaskiwin.

Federated Women's Institutes of Canada.—President, Mrs. David Watt, Birtle, Man.; Recording Secretary, Mrs. H. A. H. Rogers, Fort Saskatchewan, Alta.; Corresponding Secretary, Mrs. P. H. Speechly, Winnipeg; Publicity Secretary, Mrs. J. F. Price, Calgary, Alta.; Treasurer, Miss Annie Pritchard, Wyman, Que.

The Fraser Valley Milk Producers' Association.—President and General Manager, W. J. Park, Vancouver, B.C. This association is among the most successful co-operative organizations of producers in Canada engaged in the distribution and sale of milk, cream and the manufacture and sale of butter. The organization handles the milk of 85 per cent of the Fraser Valley producers, and is supplying milk to the residents of the city of Vancouver at the rate of 7,000 gallons per day. Its milk, containing four per cent butter fat, finds a ready sale.

NEW PUBLICATIONS

DOMINION DEPARTMENT OF AGRICULTURE

Illustration Stations, British Columbia, Alberta and Saskatchewan, 1922.—Report of the Chief Supervisor, J. Fixter, Dominion Experimental Farms.

Illustration Stations, Quebec, New Brunswick and Nova Scotia, 1922.—Report of the Chief Supervisor, J. Fixter. Dominion Experimental Farms.

Experimental Station, Invermere, B.C., 1922.—Report of the Superintendent, R. G Newton, B.S.A. Dominion Experimental Farms.

Experimental Station, Charlottetown, P.E.I., 1922.—Report of the Superintendent, J. A. Clark, B.S.A. Dominion Experiment Farms.

Experimental Station, Swift Current, Sask., 1922.—Report of the Superintendent, J. G. Taggart, B.S.A. Dominion Experimental Farms.

Experimental Station, Morden, Man., 1922.—Report of the Superintendent, W. R. Leslie, B.S.A. Dominion Experimental Farms.

Experimental Station, Lacombe, Alta., 1922.—Report of the Superintendent, F. H. Reed, B.S.A. Dominion Experimental Farms.

Cereal Division.—Report of the Dominion Cerealist, L. H. Newman, B.S.A., for the year 1922. Dominion Experimental Farms.

Bee Division.—Report of the Dominion Apiarist, C. B. Gooderham, B.S.A., for the year 1922. Dominion Experimental Farms.

Silage and Silo Construction for the Maritime Provinces.—By J. A. Clark, B.S.A., Superintendent, Experimental Station, Charlottetown, P.E.I. Pamphlet No. 35—New Series. Experimental Farms Branch.

ONTARIO

Women's Institutes of the Province of Ontario.—Report, 1922.

Horticultural Societies, 1922.—Seventeenth Annual Report.

Ontario Vegetable Growers' Association, 1922.—Eighteenth Annual Report.

QUEBEC

Constructions de Ferme.—By L. Philippe Roy, B.S.A., Chief, Field Husbandry Division. Bulletin No. 80.

Société d'Industrie Laitière et de l'Ecole de Laitèrie.—Forty-first Annual Report, 1922. Supplement to the Report of the Minister of Agriculture.

Mérite Agricole, 1922.—Thirty-third Annual Meeting. Supplement to the Report of the Minister of Agriculture.

Le Paiement du Lait d'après sa richesse en matière grasse.—By M. Omer Tessier. Circulaire 69.

Fomological and Fruit Growing Society, 1922.—Annual Meeting. Supplement to the report of the Minister of Agriculture.

Twenty Years of Practice and Experiment with Poultry. A review of poultry-keeping, especially adapted to conditions in the Province of Quebec. 3rd Edition. Revised and enlarged by the Superintendent of the Poultry Division, Oka Agricultural Institute. Bulletin No. 4.

SASKATCHEWAN

The Beef Ring.—Bulletin No. 73. Co-operation and Markets Branch.

ALBERTA

Annual Report of the Department of Agriculture of the Province of Alberta for the year 1922.

BRITISH COLUMBIA

Poultry Farm Survey, 1921.—A Report on Sixty-five Commercial Poultry Farms in the Lower Fraser Valley and Vancouver Island. Agricultural Department Circular No. 41. Department of Poultry Husbandry, College of Agriculture, University of British Columbia, Vancouver. College of Agriculture Circular No. 7.

NOVA SCOTIA

The European Apple Sucker.—Bulletin No. 10. By W. H. Brittain, Provincial Entomologist.

NEW BRUNSWICK

Proceedings of the Acadian Entomological Society for 1922. No. 8. (Formerly Entomoligical Society of Nova Scotia).

MISCELLANEOUS

The Canadian Ayrshire Herd Book.—Volume 32. Containing pedigrees 78451 to 82700. Compiled and edited in the office of the Canadian National Live Stock Records, Ottawa, 1922.

THE LIBRARY

LIST OF PRINCIPAL ACCESSIONS TO THE DEPARTMENTAL LIBRARY, INTERNATIONAL INSTITUTE BRANCH, DEPARTMENT OF AGRICULTURE.

Wild flowers of Canada. Montreal, The Montreal Star, n.d. 288 colored plates.

Bees for beginners. Welwyne, Herts., Eng. E. H. Taylor, ltd. 129 p. il.

The pioneers of Old Ontario, by W. L. Smith. Toronto, G. N. Morang, 1923. 343 p. il.

Farm implements and machinery, by J. R. Bond. London, Benn bros. ltd. 1923. 282 p. il.

Farm science; a foundation textbook on agriculture, by W. J. Spillman. Yonkers-on-Hudson, N.Y., World book co. 1919. 344 p. il.

Gardening under glass; a little book of helpful hints written particularly for those who would extend their gardening joys around the twelve-month, by F. F. Rockwell. Garden City N.Y. Doubleday, Page & co. 1923. 297 p. il.

The new air world; the science of meteorology simplified, by W. L. Moore. Boston, Little, Brown & co. 1922. 326 p. il.

Engineering on the farm; a treatise on the application of engineering principles to agriculture, by J. T. Stewart. Chicago Rand, McNally & co. 1923. 538 p. il.

The farmer and his community, by Dwight Sanderson. New York, Harcourt, Brace & co. 1922. 254 p.

The agricultural bloc, by Arthur Capper. New York, Harcourt, Brace & co. 1922. 171 p.

Farm live stock of Great Britain, by R. Wallace and J. A. Scott. 5th ed. rev. & enlarged. London, Oliver & Boyd, 1923. 868 p. il. 442 plates.

The chemistry of leather manufacture, by J. A. Wilson. New York, The chemical catalog co. 1923. 343 p. il.

The principles of agriculture; a text-book for lecturers on agriculture, rural school masters, young farmers, and students of agriculture, by James M'Cutcheon. Edinburgh, E. & S. Livingstone, 1909. 207 p. il.

A laboratory handbook of bio-chemistry, by P. C. Raiment and G. L. Peskett. London, Edward Arnold co. 1922. 102 p.

Bleaching powder and its action in bleaching. Original memoirs by R. L. Taylor. London, John Heywood, ltd. 1922. 79 p.

An introduction to the theory of statistics, by G. Udny Yule. London, Charles Griffin & co. 1922. 415 p.

Building a community, by S. Z. Batten. Philadelphia, The Judson Press, 1922. 167 p.

Poisonous plants of all countries, by A. Bernhard-Smith. London, Bailliere, Tindall & co., 1923. 112 p. il.

A science course for bakers, by David Ellis. London, Blackie & son, 1923. 175 p. il.

An introduction to the chemistry of plant products; Vol. II: Metabolic processes,. by Paul Haas and T. G. Hill. London, Longmans, Green & co. 1922. 140 p.

Precis de parasitologie humaine, par M. Neveu-Lemaire. Paris, J. LaMarre, 1921. 466 p. il.

Quantitative agricultural analysis, by E. G. Mahin and R. H. Carr. N.Y. McGraw-Hill book co. 1923. 329 p. il.

Standard mechanical practices in repairing farm machinery & equipment, by G. H. Radebaugh. Milwaukee, Wis. The Bruce publishing co. 1923. 260 p. il.

Popular poultry pointers, by R. R. Hannas. N.Y. Macmillan co. 1923. 207 p.

Ancient man; the beginning of civilization, by H. W. Van Loon. New York, Boni & Liveright, inc. 1922. 208 p. il.

The early herdsmen, by K. E. Dopp. New York, Rand McNally & co. 1923. 231 p.

The outline of science, by Prof. J. Arthur Thomson. New York, G. P. Putnam's sons, 1922. 4 volumes.

PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty, International Institute Commissioner, Department of Agriculture, West Block, Ottawa.

SCIENCE AND PRACTICE OF AGRICULTURE

GENERAL INFORMATION

1132.—**Destruction of Mosquitos by Eels.**—Dubois, R., in *Comptes rendus hebdomadaires des seances de l'Academie des Sciences*, Vol. 175, No. 10, pp. 431-432. Paris, Sept. 5, 1922.

From experiments made by the writer it was found that young eels live well for a long time in very impure water and that in such water they are very active in destroying the larvae of mosquitos, and possibly also the eggs of several intestinal worms. They are so voracious at the commencement of spring that the writer no longer found any anopheles larvae in ponds where there had been large numbers before the eels were introduced.

The writer thinks that it would be very advantageous to keep young eels in all waters containing larvae of mosquitos both in the case of drainage water and other very contaminated waters. The exceptional hardiness of these fish, their low cost, the facility with which they can be caught and transported in large numbers, make them preferable to gold-fish (which have been recommended for killing larvae) and suggest that they would be very useful for the control of malaria by natural means.

904.—**The Teaching of Soil Bacteriology.**—Brown, P. E., in *Journal of the American Society of Agronomy*, Vol. 13, No. 8, pp. 323-329. Washington, Jan. 1922.

It has been said that soil science is the basis of agriculture. It covers an extensive field and the fact that it is now taught in several courses is not only through pedantry but also because it has been found necessary in order to impart a thorough knowledge of the subject.

From experience gained at Iowa State College it may be taught with advantage in four courses, of which one is general and introductory, one final and applied and two intermediary on fertility (especially as connected with chemistry) and on bacteriology.

Soil bacteriology is a branch which has only recently been differentiated from agricultural bacteriology. In the curriculum of nearly all agricultural schools it has not yet been treated as an independent branch, but it is nevertheless of growing importance. At present soil bacteriology can no longer remain an accessory, almost fortuitous subject, included in agricultural bacteriology.

Up to the present time there is still a lack of special works on soil bacteriology; instruction should therefore be oral, and enlivened by discussion and written work, which greatly tend to enlighten the mind.

Certain subjects, such as nitrogen fixation, nitrification, the carbon cycle, the sulphur cycle, the phosphorus problem, the part played by fungi, the occurrence of protozoa, etc., should be emphasized particularly; others of minor importance, such as denitrification, should be minimized. The subject matter should not be too technical and intricate, but simple and concrete and directed towards enlightenment in the practice of agriculture, tillage, manuring, liming, drainage, etc. It should arouse the attention and keep up the interest of the pupils; and should be completed by demonstration and laboratory experiments.

1251.—**Experimental Work in Progress in the Laboratories, Rothamsted Experimental Station, England.**—*Current Leaflet*, pp. 1-8. Harpenden, 1922.

The investigations and experiments carried out at the Rothamsted Experiment Station, both in the laboratory and in the field are of worldwide importance. The following resumé has been made of the experiments now in progress:—

Bacteriological Department.—Main lines of work now proceeding:—

(1) A study of the rapid changes in bacterial numbers in field soil and their relationship to nitrate increase and decrease. The method of study consists in taking soil samples from a plot at two hourly intervals for periods up to 86 hours and estimating bacterial numbers and nitrate for each sample.

(2) A study of the soil bacteria capable of decomposing phenol, cresol and naphthaleen

These organisms are of importance as they limit the use of the antiseptics in soil, for the destruction of pests. The investigation comprises the geographical distribution of the organisms, their physiology, and the changes which accompany the addition of phenol to soil.

(3) The influence of farmyard manure on the growth of clover and other leguminous crops and on the development of the root nodule bacteria, is being studied in pot experiments and in the field.

Botanical Department.—In the Botanical Department, problems relating to the nutrition and growth of plants come under consideration and are dealt with chiefly in pot and water cultures. Special attention is being directed to the effect of high temperatures and excessive sunshine on growth and also to the stimulating action that appears to be exercised by very small quantities of certain chemical substances, such as boric acid, which are poisonous in heavier doses.

The comparative effect of artificial fertilizers on meadow hay is investigated by means of detailed separations of the hay from year to year, the relative amount of the different species varying considerably with the manure.

Soil chemistry.—(a) *Nitrogen cycle.*

(1) The rapid fluctuation in nitrate content of field soils and their relation to bacterial numbers (in co-operation with the Bacteriological Department).

(2) The rate of nitrification of sulphate of ammonia applied to field soil as early and late top dressings.

(3) The fixation of nitrogen by green algae in pure culture (in conjunction with the Mycological Department, Algology Section).

(4) The development of improved methods of analysis for the study of the nitrogen compounds of the soil.

(5) A survey of the total nitrogen content of the soil of certain fields.

(b) *Carbon Cycle:* (1) A study of the organic matter of the soil with special reference to humic products; their mode of formation, properties and distribution.

(2) The dephenolising power of the soil, with special reference to the action of manganese.

(c) Green manuring: The relative value of different systems of green manuring and their effect on the nitrogen cycle and carbon cycle in the soil.

Fertilising chemistry.—(a) *Phosphatic Fertilisers.*—A study of the citric solubility of different basic slags and mineral phosphates and its relation to their manurial value.

(b) *Potash fertilisers.*—A study of the relative manurial values of sulphate and chloride of potash, and of their effect on the soil.

Routine Analysis.—A very large number of analyses of soils, manures and plant products are made every year by the assistant staff.

Fermentation Department.—In the laboratory for Fermentation Work the methods for converting straw into artificial farmyard manure are being studied with a view to reducing the cost of production on the large scale. The fresh water required to wet the straw is not available in many places, but a considerable amount of surplus straw lies along the Essex creeks. Straw has been treated with sea water and found to produce a satisfactory manure although the fermentation proceeds more slowly than with fresh water.

Many types of waste vegetable material have been tested and some of these yield a richer manure than straw. The quantities available in this country are however very limited.

Insecticide and Fungicide Department.—The work done in this department can be classed under two headings:

(1) The study of natural and synthetic products with the main purpose of correlating chemical constitution and physical state with toxicological action on plant pests and disease organisms.

During the past two years, investigations have been made on the toxicity of many chemical products to soil pests such as wireworms and eelworms both on a laboratory and large glass-house scale.

Certain plants poisonous to insects have been examined and one of them, Tuba root found to be efficacious against caterpillars.

At present an attempt is being made to find a substitute for nicotine by examination of various synthetic products.

(2) A biochemical study of the nature of immunity particularly with reference to Wart Disease of Potatoes (*Synchitrium endobioticum*). Attempts are being made to correlate certain biochemical and physico-chemical factors with immunity. Collateral properties, such as the boiling and cooking qualities of potatoes have a place in this research.

Various grafting experiments are being done and attempts made to find a fungicide capable of eradicating the disease.

Protozoology Department.—The investigations of Russell and Hutchinson on partial sterilization of the soil lead to the view that in normal soil the increase in bacterial numbers was inhibited by a biological factor provisionally regarded as the soil protozoa. Recently satisfactory methods have been devised for counting these organisms and an extended experiment covering 365 days showed that an inverse relationship exists between the bacterial numbers and those of the active amoebae.

Flagellates do not appear greatly to affect the bacterial numbers, but in one species the active numbers show a two-day periodicity.

The physiology of the dominant species of soil protozoa is being investigated, and a survey made of the protozoan population of soils obtained from various parts of the world.

Soil Physics Department.—The properties of the soil that are at present studied in this department can be broadly divided into two groups dealing respectively with the soil particles themselves, and their relations to the soil water. The first group embraces problems of soil tilth, the effect of clay and organic matter, and the colloidal properties of soil. The second group includes studies of the complex relations between the soil-solution and the soil and an important investigation into the hydrogen-ion concentration of the soil-solution.

Considerable field work, involving dynamometer measurements with different implements, is done on soil cultivation, and in the meteorological section of the department observations are made on the effect of meteorological conditions on the soil.

Statistical Department.—The statistical laboratory was founded in 1919 with a view to applying the powerful methods of analysis supplied by modern statistics to the agricultural, meteorological, and biological observations made at the station. The Rothamsted crop weather records extend for nearly seventy years, and in accuracy as well as in extent form an unparalelled body of data for the study of the causes of crop variation. Three main causes of variation have been distinguished in the wheat yield from Broadbalk field; of these the most important is that of the weather, the very complex effects of which are in process of analysis.

Institute of Plant Pathology.—*Entomology Department.*—The work of this Department is divisible into 4 chief branches:

(1) Research work on the biology of Aphides, with special reference to the Bean Aphis (*Aphis rumicis*) including factors underlying the different phases of its reproductive capacity and the relative susceptibility to attack of different varieties of broad beans and field beans.

(2) Researches on the insect and other invertebrate fauna of the soil with particular reference to distribution in depth and the effects of manurial and other treatments of the soil.

(3) An investigation of the relative toxicity of various chemical compounds and their possible value as insecticides (in conjunction with the Insecticide and Fungicide Laboratory).

(4) The life-history of the gout-fly of barley (*Chlorops taemopus*), its winter host and methods of control.

Mycology Department.—Among the investigations in progress are: (1) The numbers, distribution and functions in the soil of the fungi and microscopic green plants (*Algae*). A monograph on these organisms and their soil activities is being prepared.

(2) The killing powers of various chemicals, heat, etc., on fungi and the way in which death is brought about.

(3) The growth of fungi in relation to various external conditions.

(4) The changeability of fungi and bacteria in various ways such as their power of attacking plants, etc.

(5) Various problems in connection with wart disease of potatoes, more particularly the relation of the last to the fungus and methods of getting rid of the latter from the silo.

(6) An intensive study of the parasitic fungus *Botrytis cinerea*, which causes grey mould.

(7) The fixation of nitrogen by green algae in pure culture (in conjunction with the Chemical Department).

CROPS AND CULTIVATION

914.—A Method for Counting the Number of Fungi in the Soil.—Waksman, S. A., in *Journal of Bacteriology*, Vol. 7, No. 3, pp. 339-341. Baltimore, May 1922.

The spores of hyphomycetes and other fungi in the soil are estimated by the plate method by the same media and dilutions as are used for bacteria. As these bacteria are very numerous, the dilution of the soil is necessarily very high; but in these dilutions the fungi become so rare that very few appear on the plate; in fact many plates are entirely free from fungi. The work therefore becomes impossible, or involves great error. But if the dilution of the soil be reduced, the bacteria become so numerous as to prevent the development and consequently the numbering of the fungi. This difficulty was obviated by making use of acid media in which bacteria do not develop but fungi grow readily; in this way a very low dilution of soil may be used. The author now gives the formula of an acid culture which gave very good results. In an experiment, he found 29,400 (± 1,700) germs per gram of soil, whereas with agaragar and egg-albumen an impossible 460,000 (± 94,000) were found, that is, 20 times as many; the soil dilutions in these two cases were respectively, 1,000 and 200,000. The method may also be applied to the determination of the number of fungi in food preparations. The formula is as follows: glucose 10 gm.; peptone, 5 gm.; acid potassium phosphate 1 gm.; magnesium sulphate 0·5 gm.; distilled water 1,000 cc. Boil, add sufficient sulphuric acid or phosphoric acid to bring the reaction to 3·6 to 3·8 pH (usually 12-15 cc. are sufficient); add 15 gm. of agar, boil, run into tubes and sterilize as usual. The final reaction should be 4 pH.

920.—Necessity for Defining Soil Types in Investigations on Yield.—BROWN, P. E., in *Journal of the American Science of Agronomy*, Vol. 14, No. 5, pp. 198-206. Geneva, N.Y., May 1922.

Until comparatively recently there has been a tendency to make a general application of culture investigations, the results of which, on the contrary, apply only to the soil used. The numerous disagreements and contradictions in the results obtained by different investigators, and even by the same investigator, should be attributed in a great measure to the fact that conditions were different and above all that different soils were used. Many of the failures of farmers when applying these results to field work are due to this; hence the distrust in these experiments felt by practical men. Nevertheless, agriculture is greatly indebted to experimental work, which has proved of inestimable economical value and needs no apology.

Few of the results of experiments apply to *all* soils; generally, the particular soil type should be taken into account. Numerous investigators continue to ignore this essential feature. This is partly explained by the fact that they wish to make the best of their results by applying them generally; at the same time the farmers ask for advice which may be put into practice without difficulty and with the fewest possible restrictions. It should be remembered also that the experimental stations and scientific laboratories have a tendency to publish as much as possible and that the investigators desire to make themselves known early and to acquire honours, which blunts their critical sense and leaves their published works defective. There is a tendency to arrive at hasty and too generalised conclusions which leads to disillusion. Applications should be more specific.

Care should be taken however not to fall into the opposite extreme, as LIPMAN and LINHART have done, according to whom fertiliser tests are of very limited application, of no practical value and do not justify the expenditure of energy and money involved. This hypercritical attitude has no foundation; unfortunately it influences the uninitiated and brings discredit on soil experimental work in the minds of other scientists, farmers and co-operative societies.

What is of importance is to determine the soil type when making investigations. Once this is done there can be no question but that under the same conditions results on the whole will be similar. After a very long experience, the writer is convinced that the classification by the U.S. Bureau of Soils gives a sound definition of soil types. This classification includes several hundreds of types; in some cases even the distinctions are so fine that it is impossible to distinguish the types described and this involves too much of the personal equation. In spite of this defect however, it is fundamentally sound and it offers a firm basis for scientific and practical men.

To prove the different reactions of dissimilar soils treated with the same fertiliser, the author describes numerous field experiments carried out on 10 soils to which he applied 5 kinds of fertiliser and on which he cultivated oats, clover and maize, and also pot experiments on 9 soils treated in the same way and on which wheat and clover were grown. Certain fertilisers proved beneficial, though in varying degrees, to certain cultures on all the soils; thus, lime to clover and manure to maize and oats. Other treatments, however, gave very different results with the same crop on different soils. Thus, in a pot test, a complete fertiliser gave an increase of 60 per cent in clover yield over the control in one soil, and 900 per cent more in another. Different soils, therefore, may respond in a very different way to fertilisers and correctives. This fact is well known as regards sulphur, potassium, etc. The influence of fertilisers as regards the nitrogen content of tops and roots varies; that on bacteria also varies, and the author has made a special study of this question. Other investigations have been made by him to determine the relations between the soil type and its chemical composition.

926.—Relation Between Nitrogen in the Soil and Live Stock Farming.—WILLIAMS, C., in *Journal of the American Society of Agronomy*, Vol. 14, No. 5, pp. 159-162. Geneva, N.Y., May 1922.

Since 1910 the writer has been making comparative experiments at the Station which he directs, in live stock farming and the direct utilisation of the various crops. The rotation followed is maize, soybeans, wheat and clover. Each area receives 2 tons of ground limestone and 700 pounds of 16 per cent acid phosphate per acre, per rotation. In the first system, all the crops except wheat are fed to live stock or passed into the manure as bedding and the manure is applied to the maize crop; in the second, the maize, soybeans and wheat are removed and sold, the hay and straw being left upon or returned to the land; and the clover is not harvested, but allowed to stand until ploughed under the following spring. The comparison shows the superiority of live stock farming, which increases the crop production and the nitrogen content of the soil.

938.—The Function of Manganese Fertilisers.—In a report by BOCHER, H., Member of the Higher Council on Agriculture at the Agricultural Academy of France, sent by Mr. Louis-Dop, French Delegate, Vice-President of the International Institute of Agriculture.

It may be said that to-day no farmer is ignorant of the action of manganese fertil-

isers, and also that among scientists few know the function and value of salts of manganese in agriculture. Nevertheless, everyone has heard of the manganese fertilisers placed on the market in 1910 by a commercial firm who advertised them widely. They were also well known after the long and minute researches made by M. BERTRAND, Professor at the Sorbonne and Pasteur Institute, who proved the following facts:

(1) Plants need manganese for the development of their cells;

(2) Manganese is a catalytic substance and a soil fertiliser.

M. PICARD of Paris in 1898 also pointed out to the Academy of Science (*Academie des Sciences*) the presence of manganese in the greater number of plants and proved its very important physiological function, especially at the beginning of plant life, at the moment of germination and early growth. M. GRANDEAU, Chief Inspector of Agronomical Stations, had also observed that manganese exists in all plants and that its presence seems necessary to plant growth. Further researches made by scientists of all countries have substantially confirmed these assertions.

Manganese acts in a variety of ways: directly or catalytically as fertiliser, stimulant, antiseptic and anticryptogamic; it accelerates germination and maturation, increases the yield and improves the crop.

Experiments made everywhere, in Europe and Japan, have given results varying in importance but rarely negative. Difference of opinion arises not as to the actual principle of the function of manganese, which is incontestable, but as to the form in which it should be used. Many consider that oxides are ineffective; sulphate and chloride have given doubtful results, but carbonate and especially lime with manganese have been almost unanimously approved. The author next reviews all the researches which have been made in this matter up to the present, and hopes that further investigation will soon solve the remaining problems.

BERTRAND has proved that the action of manganese is catalytic and influences the composition of various bodies without itself being modified, a suitable application of manganese stimulates the micro-floral activity of the soil and ensures the better utilisation of the existing food material.

BOULLANGER has proved the great difference in the catalytic power of manganese according as the soil is rich in nitrogen, phosphoric acid and potash. In poor soil, chloride of manganese gave only a slightly increased yield of potatoes, but in rich soil, it showed an increase of 32 per cent. CANDA, in Italy, also maintains that manganese has an indirect catalytic effect and dissolves the previously existing fertilisers. In poor soil, its action may even be injurious. KELLEY, on the contrary, maintains that the stimulating action of manganese is positive in poor clay-silicic soils, slight in rich soils and negative in acid soils.

STEYN and BURGERS in Holland, observed that after the use of manganese, maize showed much greater development, the leaves became much larger and there was an increase in yield of 100 qu. Aso in Japan, SOLOMON in Italy and DUMONT in France were also in favour of its use.

Investigations on the beneficial effect of manganese on plant life and especially on the acceleration of germination were made by the following: GAROLA, CROCHECTELLE, NOTTIN, BARTMANN, LOEW, BOULLANGER, VOELKER, BAUER and MOLINARI.

Experiments by RAY, PRADIER and BARTMANN prove that manganese accelerates maturation.

The increase in yield through manganese has been proved by numerous experiments, THOMASSIN obtained an increase of 20 to 35 per cent in oats and 15 per cent in beets; BOULLANGER an increase of 12 per cent in oats with lime and manganese only, and of 40 to 48 per cent by the addition of other fertilisers; Aso in Japan obtained an increase of 30 per cent in the rice yield; and BARTMANN'S experiments on maize, cabbages and potatoes were equally conclusive, as well as those by GARDA on flax, LEBLANC on asparagus and BLANCHARD on onions.

Manganese not only increases the yield, but in many cases considerably improves the quality; this is especially the case with beets. GAROLA observed that manganese sulphate not only increases the weight of beets, but their sugar content also, by 50 per cent; manganese chloride, which increases the weight still more, on the contrary increases the sugar content only 25 per cent, GREGOIRE attributes to manganese an increase in sugar content and a corresponding decrease in weight, so that there is neither gain nor loss. DELORME and BOULLANGER observed that barley for malting did not increase in weight but improved in quality, the grain becoming larger, whiter and better nourished. J. M. SAULNIER obtained very favourable results by using manganese salts.

As regards its antiseptic and anticryptogamic qualities VON BAUER observed that manganese causes chlorosis spots on diseased plants to disappear. CLAUSEN HAIDE successfully used manganese against oats jaundice. DEMOLON, SIROT and JORET proved that slags used in agriculture contain from 4 per cent to 5 per cent of manganese to which they attribute some of the useful effects of basic slag which were previously thought to be due to phosphoric acid and lime.

To sum up, from all scientific research, and in addition from the results already obtained on farms, the importance of man-

ganese becomes evident. It remains to be seen:—

(1) In what form manganese salts should be used.

(2) On what soils and crops they give the best effects.

(3) Whether they should be used alone, or mixed with other fertilisers.

The author concludes by insisting on the urgent necessity of further and numerous experiments to determine the exact value of this new fertiliser.

1152.—Borax in Fertilisers and Its Effect on Potato Growth and Yield.—BROWN, B.E., in *U.S. Department of Agriculture, Bulletin No. 998*, bibliography of 9 works. Washington, D.C., July 1922.

Injury to field crops through the use of fertilisers containing borax was first observed by CONNER, in Indiana, in 1917. Many serious cases of borax injury were reported in 1919, when ample proof of the poisonous action of this compound was given. In 1920, a series of well-controlled field tests were conducted on four different types of soil bearing crops of potatoes, maize, peas and cotton respectively.

The author gives an account of the results obtained in Maine on loam; the borax was applied at the rate of 1 to 400 pounds per acre and there were twelve experiment plots. The fertilisers containing borax were applied differently in the three sections: in section 1 they were applied in the furrow 6 days before planting; in section 2, they were applied in the furrow at the time of planting; in section 3, they were sown broadcast and well raked into the soil before planting.

After one month the number of plants in the control plots was 343; these plots had received one ton fertiliser per acre but no borax. The plot that had received 10 lb. of borax per acre had 284 plants. The 20 lb. application showed 205 plants; the 50 lb. application 116; the 100 lb. application 38; the 200 lb. 18 and the 400 lb. application only 12 plants. At the end of the second month the author inspected the sections and found great differences in them. The section which had been treated in the usual manner by applying the fertiliser in the furrow immediately before planting was the most seriously affected, while that in which the fertiliser-borax mixture was introduced into the furrow some time before planting had suffered least. As the quantity of borax increased the toxic effects progressively increased also. In section 2 the injury was apparently produced with 3 or 4 lb. per acre and certainly with 5 lb.; the injury with 10 lb., or more, was very noticeable. During the investigational survey in Maine in 1919, the amount of anhydrous borax found in commercial fertilisers ranged from 0·73 to 2·3 per cent. In view of the fact that 2,000 lb. represents the usual quantity of fertiliser applied per acre, it is clear that the amount of borax applied varied from 14·6 to 46 lb. per acre. The type of field injury shown in 1919 was similar to that found in the 20, 30 and 50 lb. applications in the borax experiment.

Some of the injurious effects noted in both seasons were as follows: failure of seed to germinate, dying back of underground shoots, bleaching of foliage, or in less serious cases, marginal yellowing of leaflets, reduction in yield. Yield when 50 lb. of borax were applied per acre, was decreased 55 per cent in the second section and 40 per cent in the first and third sections.

1268.—The Effect of the Application of Various Salts Upon the Nitrogen-Fixing Properties of Soil.—GREAVES, J. T., CARTER, T. G., and LUND, J., in *Soil Science*, Vol. XIII, No. 6, pp. 481-499, bibliography of 51 works. Baltimore, June 1922.

The authors after having studied the ammonification and nitrification of a calcareous clay, now describe a series of experiments on the nitrogen-fixing capacity of the same soil, the methods adopted being those previously used. A large number of 100 gm. soil samples were analysed and placed in sterilised test-tubes the same amount of lactose, and different quantities of the various salts used in the experiment being added in each case. The humidity was brought up to 18 per cent and the samples incubated at 28°-30° C. for 3 weeks. The amount of nitrogen was then estimated by taking the average of at least 4 determinations.

The authors employed in their experiments: the chlorides, nitrates, sulphates and carbonates of sodium, potassium, calcium, magnesium, manganese and iron. The results obtained led them to adopt the following conclusions:

The toxicity of the salts used depends upon the nitrogen fixation of the given salt, and not on the negative electro-ion as in the case of the ammonifying bacteria. In the soil chosen for the experiment, the salts proved less toxic to the nitrogen-fixing bacteria than to the nitrifying and ammonifying bacteria.

The amount of a salt that can be introduced into a soil without hindering nitrogen-fixation varies according to the salts. The proportions below which some of the salts proved innocuous were as follows:—Sodium salts, 1 part in 400 million parts of soil; calcium nitrate, sulphate and carbonate, 1 part in 400 million parts of soil; magnesium, chloride and sulphate 243; manganese nitrate 550; ferric chloride 272.

The other salts became toxic in certain proportions in the following order:—

(1) Magnesium carbonate (7) Iron sulphate
(2) Magnesium nitrate (8) Calcium chloride
(3) Potassium carbonate (9) Manganese chloride
(4) Iron carbonate (10) Potassium chloride
(5) Manganese carbonate (11) Potassium sulphate
(6) Iron nitrate (12) Potassium nitrate
(13) Manganese sulphate

None of the potassium chloride and carbonate concentration used in the experiment stimulated nitrogen fixation. The other salts, especially calcium, nitrate, sodium carbonate and potassium sulphate, increased it in varying degrees.

When the soil is not acid, the alkaline constituents hinder ammonification and nitrification much sooner than they retard nitrogen fixation.

1270.—**The Effect of the Continuous Application of Chemical Fertilisers Upon Soil Reaction.**—BURGESS, P. S., in *Agricultural Experiment Station of the Rhode Island State, College Bulletin 139*, pp. 3-35, bibliography of 22 works. Kingston, Rhode Island, April 1922.

The author describes a series of experiments undertaken with the object of determining the effect of different fertilisers upon the reaction of the soil. These experiments were conducted at the Rhode Island Experiment Station where there are many plots under the same conditions and occupying an extensive area of sandy-clay which were eminently suitable for the purpose. Samples of soil were analysed every 4 or 5 weeks from May to September 1921; they were taken near the surface (10 cm.), 12 to 26 borings being made for plot. The hydrogen ion concentration was determined in each case by HILDEBRAND'S electometric method, and the lime requirement by JONES' calciuim acetate method.

The following conclusions can be deduced from the results obtained:

Basic slags, superphosphates, bone-manure and mineral phosphate waste all help to decrease soil acidity, as was shown by the comparison of the treated and untreated plots respectively. The three first fertilisers proved the most active in this direction. There is thus no foundation for the common opinion that the continued use of superphosphates renders soils acid.

Finely-ground fish-guano and sodium nitrate perceptibly diminish soil acidity, whereas dried blood, decomposed fish, ground hoofs and offal from the abattoirs and poulterers increase the acidity slowly but steadily. Ammonium sulphate has always been found to increase soil acidity more than any other nitrogenous fertiliser.

All the potassium salts slightly diminished the acidity of the soil, kainit being the most active; next come the chloride and sulphate of potassium although there is a little difference in their influence. The carbonates of sodium and potassium have much more effect than the chlorides of these elements in reducing acidity and, calculating the oxide equivalent, are twice as effective as lime fertilisers.

Soil acidity is slightly lowered by the application of a green manure composed of non-leguminous plants, but is raised by the ploughing in of a leguminous crop; this is perhaps to be attributed to the fixation of the nitrogen contained in the leguminosae.

Other factors besides fertilisers are naturally concerned in influencing the soil reaction, of these the chief are the type of soil and the nature of the crop. They must all be taken into account before any general laws can be formulated.

1279.—**Advantages of Bicarbonate of Ammonia as a Fertiliser, Both From the Point of View of Its Production and of Its Use.**—GLUND, W., in I. *Chemiker-Zeitung*, Vol. XLXVI, No. 92, pp. 693-697. Cothen, August 3, 1922. II. *Ibidem*, No. 95, pp. 715-717. August 10, 1922.

I.—Bicarbonate of ammonia which contains 17 per cent of nitrogen and consequently 21 per cent of ammonia, has not yet been largely used in agriculture, though it has been frequently suggested. There are various prejudices against its more extended use, among which is an exaggerated fear as to its volatility. These prejudices should disappear in the face of actual farming practice, and also because, owing to conditions in Germany, there is a restriction on the consumption of sulphuric acid. Several German agricultural stations had very favourable results from experiments made in 1921.

The chief advantages of bicarbonate of ammonia are the following: it does not necessitate, like sulphate of ammonia, the saturation of the soil with useless or injurious matter: in sulphate of ammonia 300 kg. of sulphuric acid per 100 kg. of ammonia is required; 75 per cent therefore is not utilised. In 1909, 322,000 tons of sulphate of ammonia were applied to the soil, representing 239,000 tons of sulphuric acid, which, under present conditions, would be very expensive. Further, and this is still more serious, sulphuric acid transforms the lime of the soil into gypsum and acidifies it: potash and phosphate fertilisers lose their efficacy if this disadvantage is not avoided by liming; free sulphuric acid often is found, which damages roots, etc. Chloride of ammonia which is more economical than the sulphate and is therefore coming more and more into use, also posesses disadvantages: the chlorine combines with the calcium of the soil and forms soluble chloride of calcium, which is carried away by the rain, and the soil "cools."

Besides these negative advantages all the components of bicarbonate are useful: carbonic acid is one of the most important fertilisers and its action is exercised on the roots as well as on the leaves. Further,

carbonic anhydride costs next to nothing and may be had in unlimited quantities.

Bicarbonate, owing to its fine but not powdery consistency, may be easily spread over the soil, and even after a long period does not become clotted; on the other hand, carbonate has given bad results, for it forms into hard lumps, and the fact that farmers have often mistaken it for bicarbonate has been prejudicial to the latter.

There remains the great objection of volatility, but it has been much exaggerated, It has been proved that up to 50° and under unfavourable conditions, bicarbonate of ammonia loses almost exclusively carbonic anhydride, and only 0·12 per cent of ammonia on changing into sesqui-carbonate. It may be used as a fertiliser mixed with superphosphate, in which case it is fixed by the acidity of the superphosphate. It may be kept for about a year in the ordinary packing without appreciable loss, provided the atmosphere is dry. More impermeable packing may be used than the ordinary boxes and canvas bags. Excellent results have been obtained with paper bags prepared with a special resinous solution. Altogether it may be estimated that from the time of its storage in the factory until it is applied to the soil, less than 5 per cent is lost. Moreover, sulphate is also volatile to a certain extent.

From the industrial point of view it is advantageous in all respects. Ammonia is obtained by direct synthesis by means of the HABER process; carbonic anhydride is a by-product of gas-works and the HABER process. The disadvantages attendant on the use of sulphate in farming have already led to an examination of the question of producing urea on a large scale; it is a neutral fertiliser, but the process of manufacture is complicated; also, the starting point in the process is bicarbonate of ammonia which, in consequence, will always be the more economical.

II.—The writer afterwards examines the various industrial manufacturing processes of bicarbonate of ammonia, shows their simplicity as compared with those of other nitrogenous fertilisers and draws attention to their economic advantages.

Further, in contrast to the other manufacturing processes, that of bicarbonate would be independent of several variable factors, such as the price of sulphuric acid, that of nitric acid, etc. The manufacture of bicarbonate, however, cannot be developed in Germany yet as it should be, on account of limitations imposed by the war.

1280.—Chloride of Ammonium as Manure.—MAUME, L., in *Le Progres agricole et viticole*, Vol. 39, No. 25, pp. 588-592. Montpellier, June 18, 1922.

The writer gives an account of experiments made at the National School of Agriculture at Montpellier on two series of plots: in the first series the manuring was done 10 days before sowing and in the second series on the same day as the sowing. The plots were treated with various nitrogenous manures to the extent of 54 lbs. of nitrogen per acre and then sown with wheat. Taking the yield of the control plot, which was not manured, as equal to 100, the results with the various manures were as given in the following table:—

RESULTS OF THE MANURING EXPERIMENTS

Plots	In the first series		In the second series	
	Total weight of the crop	Weight of the grain	Total weight of the crop	Weight of the grain
1. Control	100	100	100	100
2. Cyanamide of calcium	120	148	102	108
3. Nitrate of soda	143	178	136	170
4. Nitrate of lime	134	152	115	145
5. Nitrate of ammonia	131	153	116	148
6. Sulphate of ammonia	128	152	117	148
7. Chloride of ammonium	134	154	123	150

Chloride of ammonium is therefore comparable with sulphate of ammonia, nitrate of ammonia and nitrate of lime and it could be used to great advantage as soon as it can be obtained at a more reasonable price.

The data in the table above show that generally there is great advantage in manuring before sowing, especially in the case of cyanamide of calcium, which had only a negligible effect in the second series, while it proved very effective in the first.

1282.—**Selection and Treatment of Waters for Spraying Purposes.**—Deong, R. E., in *University of California Publications, College of Agriculture, Agricultural Experiment Station, Berkeley, California*, Bulletin No. 338, pp. 301-314. Berkeley, California, December 1921.

Hard water forms dangerous combinations with or destroys the efficiency of many forms of insecticides. Such waters are very common, especially in the West of the United States. Their distribution and degree of hardness is however a matter of which the knowledge is approximate only.

Softening hard waters by means of caustic soda or other water softeners is not completely successful in all cases, and hauling soft water from a distance in quantities sufficient for spraying purposes is frequently impracticable. Surface waters are usually softer than underground supplies, but storage of surface water during rainy seasons is possible only in limited areas.

Water softening plants may be installed at a cost of a few hundred dollars with a sufficient capacity for supplying a spraying outfit and also meeting the ordinary needs of the home.

The use of dusting materials in certain cases in place of liquid sprays, offers an advantage in that the user is independent of the type of water.

Insecticides, compatible with the soluble salts commonly found in waters are valuable and may be a satisfactory solution of the difficulty in some cases.

Water containing chlorine at the rate of 20 parts per million or more has been reported as dangerous to use with acid arsenate of lead, a soluble form of arsenate being formed, which may cause severe injury to foliage. Basic arsenate of lead should be substituted for the acid type, if used with very hard or alkaline waters.

Californian waters have an unusually high chlorine content, which may account for cases of arsenical injury that have occurred where acid arsenate of lead has been used.

1289.—**On the Tillering of Wheat.**—Garicke, W. F., in *American Journal of Botany*, Vol. IX, No. 7, pp. 366-369. Brooklyn, July 1922.

The writer had previously remarked that nitrogen supplied to wheat at different times, had different effects; at an early stage it had little effect; at a later stage it caused an increase in the nitrogenous reserves of the grain and the whole of the dry matter in the plant. These experiments were made with a soil poor in nitrogen.

In the paper reviewed, the writer investigated the process by the help of which nitrogen induces tillering. He supposed that it acted by favouring the growth of the roots. In order to verify that supposition, he grew wheat plants, from 8 to 10 cm. high, with roots 10 to 12 cm. long for 25 days in drinking water: the roots grew to a length of from 50 to 70 cm., while the stems scarcely grew more than 1 or 2 cm.; he then moved the plants together with the control plants, and placed them in complete nutritive solutions; the weight of the aerial part was approximately equal in the two series, while the weight of the roots was respectively about ½ and ¼ of the total weight and the roots in the first series were 4 times as long. The control plants tillered very slightly, generally a single stem per plant; on the other hand the young plants with large root development tillered in a remarkable manner; the averages were, respectively, 1·2 and 5·4 per plant, a proportion of 1 : 4·5.

A large root development, therefore, is very favourable to tillering. In a soil poor in nitrogen, the roots develop very much because they seek out nutritive elements; if a large amount of nitrogen is put into the soil, the roots absorb it and vegetative growth is stimulated in them; there is consequently much tillering; on the other hand if nitrogen is given during the early stage of growth, the roots do not develop much and the growth cannot be stimulated later.

These data may be important for the cultural economy of wheat.

958.—**A New Test for the Maturity of Fruit.**—Murneck, A. E., in *Station Bulletin* 186, 28 pp., 9 figs. Corvallis, Oregon, Nov. 1921.

Experience shows that pears, unlike other fruits, must be harvested in a comparatively unripe condition; thus Bartletts, when picked hard and green, ripen perfectly and attain the highest quality.

In most districts, the harvesting season of this variety lasts about a month, whereas it may take 6 or 8 weeks from the date of the first picking to the time the fruit becomes fully ripe on the tree. It would be useful to know exactly the right moment for picking in order that the highest keeping and eating quality may be realized. For this purpose it would be necessary to know exactly the changes that take place as maturity advances.

Many tests have been used to ascertain the stage of maturity of pears and the best time for picking: the colour of the skin, the colour and toughness of seeds, the sweetness, the ease with which the fruit stem will separate from the spur, the ease with which the fingers may be pressed into the fruit, the disappearance of starch, as tested by potassium iodide, etc. Ordinarily for Bartletts the largest transverse diameter (about 2¼ inches on an average) is taken as an index. All these tests, are however, uncertain. The Oregon Agricultural Experiment Station has therefore endeavoured to find a simple but reliable test. This problem has been made a part of the pear harvesting

and storage investigations which were begun in 1917 and have already formed the subject of two reports.

It has been recognized that the amount of pressure required to wound the fruit, that is, its resistance to pressure, gives a good, practical and delicate test.

To measure this pressure exactly, an apparatus was constructed after several attempts, a kind of pressure register, which solves the problem pretty well. The pressure required for a small metal cylinder to penetrate to a determined distance is registered in pounds on a scale.

To eliminate individual variation, it is well to examine lots of from 10 to 15 pears. The test should be made 6 hours after picking, and Bartletts, under good harvesting conditions, should register on an average 35, and not less than 25 pounds. If they register more, they are very ripe and may be used with advantage for canning or preserving. The Bosc variety should register 26 to 20 pounds when picked.

The author has applied the test to other varieties of pears and to apples and several fruit growers in the States of Oregon and Washington have already adopted it. The author has also studied the increase in diameter and weight of Bartlett pears during development. The transverse diameter increases each week 5·1 per cent on an average, and the weight 17·7 per cent, until the maximum development has been attained. The ratio of percentage increase in weight to that in diameter is therefore about 1: 3·5; but deviations and exceptions render this criterion uncertain and not very practical.

LIVE STOCK AND BREEDING

1184.—Should Milch Cows Which React Against Tuberculin be Sacrificed?—CALMETTE, A. (Sub-Director of the Pasteur Institute at Paris) in *Revue veterinaire*, Vol. LXXIV, No. 6, pp. 356-362. Toulouse, June 1922.

The Board of Health of the Aisne Department have expressed a tentative desire to make the tuberculization of cows kept for the public milk supply compulsory, and to order that all cows which react against it be sent to the slaughter-house. It is clear that if it were proved that there is a large percentage of milk cows reacting against tuberculin in France, the adoption of such measures would be attended with serious consequences, for it would cause a decrease in milk production and an increase in price of milk.

It would be opportune, therefore, to examine some of the facts recently established regarding the part played by bovine tuberculosis in human infection before putting these measures into execution.

It is known that the bacilli of tuberculosis *adapted to the bovine species*, have special characteristics which clearly distinguish them from those *adapted to the human species*, that the former are rarely met with in human tuberculosis and that the latter are but very slightly virulent towards cattle. For this and other reasons, it may be affirmed that bovine tuberculosis only plays a very small part in the etiology of human tuberculosis, and that consequently the campaign against it from the point of view of safeguarding of the public health is of little importance.

It is perfectly natural, on the other hand, that the economic interests of agriculture urge breeders to protect their cattle against bacillary infection, which causes a decrease in milk production and prevents the fattening of the infected animals.

The extent of these losses is considerable; they may be estimated in France, before the war, at 20,000,000 fcs. a year and in 1920, according to the statistics of the Veterinary Sanitary Department, about 2,000,000 cattle out of a total of 12,757,720 were tuberculous.

The writer asserts that all those animals which react against tuberculin are not tuberculous or liable to propagate the disease, but that reaction simply indicates the existence of a seat of infection which, in the majority of cases, remains occult or latent, and which, in many animals, is cured when the latter are kept free from infection for a sufficient time. It is inadmissible, therefore, that cows, without any trace of disease having been detected after a clinical examination and whose milk contains no tuberculous bacilli, should be excluded from milk production on the mere pretext that they have reacted against tuberculin. If this happened, it may be estimated that milk production in France would be reduced by a third, thus entailing a proportional increase in price without any appreciable advantage to public health.

The writer concludes with the assertion that from the sanitary point of view the measure proposed by the Board of Health of the Aisne Department appears unacceptable.

1186.—Sheep-Killing Dogs in the United States.—COLL, M. W., in *Farmers' Bulletin No. 1268 (United States Department of Agriculture)*, pp. 1-30, Washington, June 1922.

Sheep-farming in the United States has greatly varied in the last 5 years; the number of sheep decreased from 64 millions in 1903 to 26 millions in 1922, while the population has increased to such an extent that the present wool production of the U.S. is only one-half of that required. The future welfare of the people therefore requires that the greatest efforts be made to extend sheep-farming. This is rendered easier and more profitable by the fact that grazing and feeds are comparatively cheap and the demand for meat and wool is great. Among the obstacles against sheep-farming which

discourage farmers and prevent others from taking up this industry, should be mentioned the losses, sometimes considerable, caused to the flocks by dogs. The dogs which kill sheep generally range in small groups of two or three, but sometimes alone. They pass over a territory of several miles, attacking and destroying the flocks they meet with; and as they carry on these operations at night it is difficult to find them and still more difficult to take them in *flagrante delicto*. Some dogs kill one or two sheep, others as many as they come across; others again chase them until they die of exhaustion; these sheep are found dead without bites or wounds. Once a dog has killed a sheep it will kill others and will encourage other dogs in the same habit, which habit it is very difficult to cure. Their extermination therefore becomes a necessity.

A good means of protection is to pen the sheep on a grazing-ground surrounded by a wire netting about 6 feet high; but this is dear and can hardly be erected except on a small extent of ground. Better laws regarding the policing of dogs should be made than those which are now in force; the people would help to maintain them and they could be easily and advantageously applied. A very high dog tax could be levied in order to restrict their numbers, and the residue of such tax applied to relieving the losses caused to sheep owners. In some states there is no special legislation in this direction; the right to tax dogs is left to the parish, but this system does not give entire satisfaction. Other states have laws, which do not, however, require that the dogs be identified; others again require that they be identified and a description of the dogs kept in registers; a collar with a metal disk bearing a progressive number, the year and the name of the State, is placed around the dog's neck. In several states the owners are obliged to keep their dogs under control, especially at night; in other parts, dogs caught killing or chasing sheep may be killed, and in others again this is allowed when the dog is found out of doors during the night without its owner, or when it is without its collar with the disk, or when it can be proved to have killed sheep. The most recent laws provide for the possible compensation of the farmer for sheep killed or mutilated. In every state the owner of the dog is held legally responsible for any damage caused by the dog, but owing to the difficulty of identifying the owner, the farmer generally is only insufficiently protected. This is also the case in those states where farmers receive compensation out of the dog taxes, which are almost always insufficient.

In a word, the different states must take new, better and, as far as possible, uniform measures to remedy the defects of the existing laws. The writer quotes and examines the laws of the different states and draws attention to those of Michigan, which have given the best results. The writer advises all the states to adopt a law, with possible modifications and adaptations, based on the following essential points:

A tax to be paid on every dog of over four years, which must wear a collar with a disk supplied for the purpose; all dogs must be kept under control during the night and the owner to be fined for any infraction of this law.

The farmers to be compensated.

Dogs without an owner or which are caught mutilating sheep or poultry or found on an enclosure not belonging to their owner, may be killed.

1328.—Comparison Between Calcium Chloride and Other Calcium Salts as a Stock Feed.—Loew, O., in *Suddeutsche Landwirtschaftliche Tierzucht*, Year 17, pp. 13-15. Munich-Hanover, January 27, 1922.

Calcium salts, the carbonate (chalk), and the phosphate have hitherto been fed to young stock in the form of a powder mixed with their rations, for the purpose of promoting bone development. Recent experiments have proved that the calcium salts present in the blood and muscles have other no less important functions than that of building up the skeleton, and must be regarded as factors essential to the normal working of the living organism. It is not known at present how much of the powdered calcium given to the animals is assimilated by the blood and tissues or in what percentage it is absorbed by the stomach. In any case, it is necessary to administer the calcium salts in a form soluble in water and which can be easily assimilated.

The use of chalk, the calcium compound generally employed, has many drawbacks, as calcium carbonate is dissolved by the acid in the gastric juice, which acid is required for digestion and is indispensable for the digestion of albuminoid substances.

In order to produce any perceptible effect on the organism, a very large amount of chalk (1·6 ounces) must be ingested daily; this requires for solution 4 gallons of gastric juice which is thereby completely neutralised and rendered relatively incapable of digesting the remainder of the ration. Further, the lack of gastric juice allows the numerous bacteria in the stomach to multiply freely. These statements have been proved by the results of some pig-feeding experiments in which the animals given maize, blood-meal and chalk developed more slowly than those that had received no chalk. The author is of opinion that calcium chloride is preferable to chalk, if given in much smaller quantities, as its effects are quite as beneficial and rapid as those of calcium carbonate and it has fewer drawbacks. In addition,

calcium chloride is of therapeutic value in the case of certain specific diseases (Diarrhoea, and sometimes in deficient bone development) whereas chalk has no such property.

Chloride of calcium is more expensive than carbonate of calcium, but is used in smaller quantities and produces a great increase in the live weight of stock, especially in the case of pigs. The results of experiments on young cows given carbonate of calcium showed an average increase in live weight of 220 lbs. as against 280 lb. obtained with chloride. In other experiments with 15 cows, the animals fed calcium chloride increased 10·1 per cent in live weight, while those given calcium carbonate only increased 8·5 per cent. If only the 6 youngest cows are taken into account, the average live weight increase was 20·5 per cent with calcium chloride, and 15·3 per cent with calcium carbonate. This shows clearly the superiority of the chloride, especially in the case of young growing animals.

1335.—**Experiments on Cattle Feeding in the United States Experiment Stations.**—Smith, W. H., in *The Breeders' Gazette*, Vol. LXXXI, No. 3, pp. 71-72. Chicago, January 19, 1922.

During the last two years United States breeders have suffered heavy losses in cattle breeding, the total of these losses being ascertained from information collected at the experimental stations. From experiments made in 1919-1920 by experimental stations in the states of Nebraska, Wisconsin, Missouri, Indiana and Pennsylvania, which reared 26 lots of 256 calves, a net loss of about $30 per head may be inferred; similar results were obtained last season: 28 lots containing 247 beasts belonging to the experimental stations of the states of Nebraska, Iowa, Indiana, Minnesota and Pennsylvania showed a loss of about $26 per head.

Breeders, remembering that during recent years rations containing a large percentage of maize silage, with or without a few grains of maize, had given better, or at any rate, not worse results, applied to experts to know what quantity of maize should be added to the rations. To determine this quantity exactly experiments were conducted at several experimental stations. At the end of 1920 at the stations of Nebraska, Indiana and Minnesota, rations containing no maize were fed to one lot of steers and it was ascertained that in every case the rations without maize gave the heavier losses, while those with much maize, or of maize only gave the smallest losses. These results taught the farmers not to rely on the results of previous years and thus adopt rations which might have been good in time of war, that is to say, when economic conditions were very different, but owing to present prices, were no longer profitable.

F. C. King (of the Indiana Station), notes, in examining the data for a period of 5 years, that the highest profits were always obtained by feeding with maize only. It was not until 1919-1920 that the use of silage-foods showed greater profits while the use of rations composed partly of silage foods and partly of maize was never profitable. After ascertaining that the most profitable ration is that composed entirely of maize an attempt was made to determine how and when the nitrogen supplement should be given. At the Minnesota and Nebraska Stations, the supplement was given in the form of linseed meal cake, but at both it was noted that the loss was more or less increased. At the Indiana Station cotton meal cake was used with better results and the loss decreased by about $2.40 per head. The experimentors at the Pennsylvania Station state that a nitrogen supplement is to be recommended and they tried to find out whether linseed meal cake or cotton meal cake was preferable. Linseed meal cake being laxative is more suitable for the steeers but it is better to use the cotton meal cake when the ration is largely composed of silage foods. The stations have also made experiments with substitutes for cereals, introduced during the war, the use of which tends to be continued on account of the high cost of cereals. They have ascertained that the use of barley with molasses instead of maize has never given satisfactory results.

1347.—**Lucerne as Pasture for Pigs, in Germany.**—Frolich in *Zeitschrift fur Schweinezucht*, Year XXIX, No. 6, pp. 81-84. Neudamm, April 1, 1922.

The general importance of lucerne as a feed has always been recognized in Germany and the question of its particular utility as pasture for pigs deserves consideration.

The writer, after finding that the experiments on the subject hitherto made in Germany were insufficient, undertook a series of researches to ascertain if it were really profitable to utilize lucerne this way or not.

Twenty-two young "Landrasse" sows, slightly modified by crossings with a superior breed of a total weight of 4,136 lb. (average 187 lb. each) and a sow weighing 312 lb. were put out in a lucerne field with four wooden sheds where they could graze for about 2-3 hours daily. As the lucerne was already well grown the animals were allowed to graze for one morning only, the lucerne was then cut; three days later the sows were again allowed to graze; grazing had to be suspended on two other mornings after the second and third mowings. The lucerne was cut three times; it was found that the sows did not eat it so readily as before, perhaps because it had grown during very

dry weather; the sows only ate the upper part and did not touch the lower; for this reason other freshly cut lucerne had to be given to them.

Eighteen animals remained on the pasture for 102 days, 5 from 63 to 70 days; there was an average increase of 4 ounces each per day. On the other hand in the case of 5 sows the increase in weight was very much less than for the others; the writer therefore recommends ascertaining whether the animals are profiting by the pasture by weighing them regularly and eliminating those which are not giving good results. In addition to the lucerne eaten by the pigs the lucerne field yielded 4,300 lb. of hay in the three mowings and the area of the pasture was such that it would certainly have yielded a total of 15,000 lb. of hay, equal to 20 tons of green stuff; the daily ration of each sow was therefore 16 to 19 lb.

In conclusion it may be stated that pasture has considerable food value; really lucerne is one of the best foods for animals on account of its considerable albumen content, and they eat it readily, at any rate so long as it is not too old. Later on many of the sows littered and produced a considerable quantity of milk.

1348.—**Rape as a Valuable Pasture for Pigs.**—Rice, B. J., in *The Breeders' Gazette*, Vol. LXXXI, No. 16, pp. 329-350. Chicago, Ill., April 20, 1922.

Rape is one of the best forage crops for pigs, and compares favourably with lucerne and young clover; results of analysis show that it contains 20-25 per cent of protein and has a high content in ash and a low content in cellulose. The full-grown crop is succulent and very acceptable to animals; in favourable conditions one acre of rape provided sufficient pasture for 12 to 20 pigs from June 1 to October or November. By sowing in April it is possible with care to feed six porkers; the June growth, if there is a slight rainfall, will feed the pigs during the summer months or in the early autumn, when the pigs which are now much larger, can eat a considerable quantity. Animals fed on a succulent nitrogenous crop such as rape in July, August and September fatten more quickly and the meat finds a ready market.

Both statistical and experimental results agree in demonstrating that rape is economically one of the best pastures. During the experimental period at Illinois, pigs which were fed on maize and pastured on lucerne required for each increase of 110 lb. in live weight about 6½ lb. of maize more than the pigs which were fed on maize and pastured on rape. At the Purdue University pigs fed on rape put on 18 ounces of weight daily and those fed on clover only just over 1 lb. and the quantity of supplementary feeding necessary in relation to increase in weight was less with the rape. The pastures used on the farms, which in 1916 and 1917 gave the best selling and most profitable pork, were clover, lucerne and rape.

Rape is not only useful as a pasture in summer and autumn but can also be sown with maize; it makes better growth when the maize is not too closely sown. The crop cannot entirely replace the nitrogenous feed, which is needed by maize-fed pigs, but can greatly reduce the requirement.

The use of rape has the disadvantage that the leaves are so heavy that the dew is not evaporated before noon; hence the young pigs get wet and may contract illness through exposure to the sun's rays. However it is always possible not to put the young pigs to pasture in the morning and to give them instead a dose of oil.

1205.—**The Rearing of Geese in the United States.**—Lee, A. R., in *Farmer's Bulletin 767, United States Department of Agriculture*, 22 pp., 12 figs. Washington, Jan. 1921 (Revised April 1922).

In the United States geese are reared most abundantly in the south and middle west. According to the census of 1920, Illinois contained the greatest number of geese (195,769), followed very closely by Missouri, Arkansas and Iowa, and at a greater distance by Kentucky, Tennessee, Minnesota, North Carolina and Texas. During the last 10 years goose rearing has shown a tendency to greater extension in the Northern part of the Central States than in the southern part. About a tenth of the farms in the United States rear geese.

Six breeds of geese have been admitted to the "American Standard of Perfection," namely, Toulouse, Embden, Chinese, African, Wild or Canada and Egyptian. Besides these, the Sebastapol goose is also reared as well as hybrid varieties made by crossing the Canada with one of the above-mentioned breeds, generally the Toulouse or African. The African gander is occasionally crossed with the Toulouse and Embden, but never beyond the first generation; this cross is not generally advisable, and is suitable only for the production of geese intended for early killing or for fattening. The Toulouse and Embden breeds are the most extensively raised. Geese are kept primarily for the production of flesh and feathers, while eggs are of secondary importance.

The standard weights of the different breeds for the adult gander, young gander, adult goose and young goose respectively are: Toulouse 12-9-9-7; Embden, 9-8-8-7; African, 9-7-8-6; Chinese and Wild or Canada 5·5-4·5-4·5-3·5; and Egyptian 4·5-3·5–3·5-3.

The writer describes each of these breeds, and in connection with rearing gives rules regarding the construction of houses or shelters, selection, incubation, feeding of goslings, fattening and plucking feathers.

In an appendix a list of 25 works issued by the United States Department of Agriculture on poultry raising and egg production is given.

AGRICULTURAL INDUSTRIES

1220.—**The Sugar Industry in Russia Before and After the War.**—DADE, in *La Reconstruction*, No. 3, pp. 13-14. Berlin, May 27, 1922.

The growth of sugar beet in Europe has opened unexpected fields to the agriculturist. From an economic standpoint it has given an industrial complexion to agricultural enterprise and has improved the yield of the soil in a manner hitherto not thought to be possible. The mellowing of the soil by the deep roots of the beet, manuring and other favourable results inherent in this kind of cultivation have increased not only the yield of the beet itself, but also that of other crops grown afterwards on the same soil, as for instance that of wheat. From the social standpoint this cultivation has mobilized the agricultural labourer. The cultivation of beet had expanded to such an extent in Europe during the 20 years before the war that its production almost equalled that of sugar cane. Thus in 1912-13 the world's production of beet sugar reached 9,000,000 tons and that of cane sugar 9,300,000 or 18,300,000 total production. The production of beet sugar was therefore as much as 49 per cent of the whole sugar production. Probably no branch of agriculture was so hardly tried by the war. The restrictive measures taken by the state, the lack of artificial manures and labour caused the cultivation of beet to decrease by more than half its previous production. At the time when the production of cane sugar increased to almost 12,000,000 tons, that of beet sugar fell to 3,500,000 tons total, or scarcely a quarter of the production in 1919-1920. Before the war Germany headed the European production with 2,700,000 tons of sugar. Russia, with 1,900,000 tons came second, and had exceeded, shortly before the war, the Austro-Hungarian sugar production. The lowest yield was that of the crop of 1919-20, when Germany produced only 720,000 tons, that is to say a quarter, and Russia only 350,000, or a sixth of their pre-war production. In Germany it recovered in 1921-22 to about 1,400,000 tons, or 50 per cent of the old production, but in Russia it is still fairly low. Apart from Polish soils it is mainly the "black soil regions," especially in the Province of Kiew, Podolia, Volhinia, Tschernigow and Poltava, which are particularly suitable for sugar beet cultivation. In these provinces sugar beet cultivation, under the action of the "Normirowska" Syndicate, had reached a development which made these provinces the greatest competitors among producing countries of Western Europe in the world's market. These provinces having combined in 1902, at the time of the Brussels convention and having paralyzed Russian export, the Russian Government endeavoured to preserve its sugar industry by legislative measures. However the home consumption of the country could not be increased quickly enough and it was not easy to find new markets in the east to compensate for the loss of the western markets. Thus overproduction ceased to increase. The Russian Government was then obliged in turn to join in the Brussels convention in 1907. In 1912 the convention was renewed on the condition that its renewal should last up to 1918, and that Russia should have the right of export to the adherent countries of Western Europe, over and above her annual quota of 200,000 tons, an excess of 150,000 tons for 1911-12 and a surplus of 50,000 tons for the following years.

When war broke out, there were in Russia about 270 sugar factories, the area under beet crops was about 700,000 hectares and the production was over 100,000,000 pouds (about 1,630,000 tons). At the present time only one-third of these sugar factories are working, and the area under cultivation is not more than 40 per cent of the former area. It is not only the area under cultivation which has enormously decreased, but also the production of sugar. According to reliable information, beet growing has not, it is true, suffered so greatly from the war and the revolution as other branches of agriculture, because the peasants have understood its great importance and have managed more or less to preserve it from destruction. In the sugar industry also, the tendency was to pass on to the small rural proprietor an increasingly important part in the beet crop which formerly belonged exclusively to large proprietors. It should also be added that the labour question does not present the same difficulties in Russia as elsewhere, for work is generally done with the help of the peasants of the neighbourhood.

An attempt is now being made in the Ukraine to restore the beet sugar to its pre-war level and to procure seed in Germany so as to be able in three years to grow the necessary plants. Some experts even think that, if the situation remains quiet, in three to five years at latest, the growing of sugar beet will to a large extent recover in southern Russia.

1226.—**The Foaming of Cream.**—BABCOCK. C. J., in *U.S. Department of Agriculture*, Bulletin No. 1075, 22 pp. Washington, D.C., July 13, 1922.

Owing to the increasing use of whipped cream as human food and the small amount of knowledge that we have on the subject of the factors which determine the aptitude of cream to foam, the writer undertook an

experimental investigation. To measure the consistency of whipped cream, he invented a very simple apparatus, composed of a very small balance bearing a counterpoise at the end of one of its arms, and provided at the end of the other arm with a small rod ending in a disk; the counterpoise is moved until the disk penetrates into the cream, and the graduation on which the counterpoise happens to be indicates, approximately, the pressure in grammes per square inch. The results obtained may be summed up as follows:

Non-pasteurized cream whips better than pasteurized, homogeneized or pasteurized-homogeneized cream. Pasteurization slightly reduces the aptitude of the cream to foam, especially when it contains less than 23 per cent of fats. Homogeneization reduces very much the aptitude of cream to foam; the greater the pressure required to homogeneize the cream the more the aptitude of the cream to foam is reduced. Homogeneization combined with pasteurization renders the cream practically useless for whipping. The aptitude of cream to foam, whether poor or rich in fats, pasteurized or not, homogeneized or pasteurized-homogeneized, increases with the age of the cream. But the age of cream necessary for successful whipping varies with the quality and the fat content of the cream. In any case the most rapid changes take place during the first 48 hours, and after about 72 hours the greatest yield of whipped cream per weight unit of cream is obtained.

The aptitude of cream to foam improves with an increase in the fat contents up to 30 per cent; in higher percentages the quality or consistency of the whipped cream does not sensibly improve but the consistency lasts longer and the time required for whipping decreases.

Temperature is an important factor in the whipping of cream. To get good results, the temperature of the cream should not exceed 7°C. (44·6°F.)

Increased acidity by adding lactic acid or by natural acidification does not affect the aptitude of cream to foam so long as the acidity does not exceed 0·3 per cent; beyond that degree of acidity the cream has an acid taste.

"Viscogen" suitably used increases the aptitude of cream to foam and does not affect its taste. "Viscogen" (Babcock and Russell), The Restoration of Consistency of Pasteurized Cream, *Wisconsin Agric. Exp. Station, Bulletin* No. 54) is prepared in the following manner:—2·5 parts by weight of sugar are dissolved in 5 parts of water; 1 part of quick-lime is dissolved gradually in 3 parts of sugar and water; the liquid is strained through a sieve; the filtrate is stirred frequently and two or three hours later it is allowed to settle until the clear liquid at the top can be siphoned off. It must be used with discretion, that is to say in a quantity insufficient to render the cream alkaline.

Sugar added in sufficient quantity to thoroughly sweeten the cream, whether it is added before or after whipping, decreases its aptitude to foam; the smaller the amount added the less its effect. The addition of aromatic essences has no effect either on the quality or preservation of the whipped cream. The most important factors which determine the consistency are temperature, the quality of the cream and its fat content.

Cream powder will not whip. Condensed milk can be made to foam but the whipped cream so obtained disintegrates immediately; such milk therefore cannot be used for the purpose.

PLANT DISEASES

1386.—**A New Potato Disease Observed in Morocco.**—Miege, in *Bulletin de la Société de Pathologie Végétale de France*, Vol. IX, Part 2, pp. 109-112. Paris, 1922.

In 1920 and 1921, a new potato disease was reported from Morocco which causes considerable damage to the crops, but varies in its intensity and attacks most of the cultivated varieties of potato at all seasons of the year.

From field observations made at Rabat, the disease on the aerial portions of the plant is clearly basipetal, for it always starts at the extremity of the branch and usually, although not invariably, begins at the apex, or in the centre of the plant. The terminal leaflet becomes covered with brown patches as if it were scorched, and then turns black and withers quickly and completely. The petiole is immediately infected at its upper end and this part soon dries up and breaks off leaving intact the lower portion which remains healthy and green.

The disease continues to spread and quickly passes down the branch to the stem, destroying successively all the leaflets. At the end of some days the whole branch turns entirely black, withers and falls off; the main stem itself is attacked and becomes covered with elongated, blackish patches that start from the point of contact with the infected branch.

Sometimes the tubers are attacked before they are ripe; in certain cases on the contrary, the disease only makes its appearance on the potatoes themselves some days, or even weeks, after they are lifted. On the surface of the tuber small violet-black spots are seen; at first they are few in number, but they gradually increase. Subsequently, the portion of the layer beneath these spots turns a livid blackish-brown, and the affected area extends progressively. The disease spots liquify and exude, under the pressure of the fingers, a rather clear liquid. Then the tuber soon rots and becomes unusable.

The potato crop is much reduced, for even before the disease appears on the

tubers, their number and size are much diminished.

This disease is probably of bacterial origin. A bacterium has been isolated from infected plants and cultivated. The micro-organism was inoculated into twenty sound plants with foliage belonging to the "Geante sans Pareille" variety. The first symptoms of the disease showed themselves twelve days after the inoculation. Later it spread and became more virulent, and at the harvest time, several of the tubers exhibited the characteristic round violet-black spots. Further researches are however necessary, for it is impossible to arrive at any definite conclusions respecting the disease from the preliminary experiments hitherto made.

1389.—Mollisia Earliana, an Ascomycete Injurious to Strawberry Plants, in Ontario, Canada.—STONE, R. E., in *Phytopathology*, Vol. XII, No. 8, pp. 375-380, 3 figs. Lancaster, Pa., Aug. 1922.

In several places in Ontario, many strawberry gardens are seriously affected by a disease, the presence of which may be detected in May by the appearance of small irregular purple spots on the borders of the leaflets; stripes of the same colour appear simultaneously on the petioles and on the floral peduncles. Gradually the spots increase in size and meet each other so that the whole leaf may be attacked. As the spots develop they become grey or ash coloured with a purple edge, which finally disappears. As the disease progresses all the leaves of the plant look dried up as if they had been scorched by fire. In the following spring the disease shows itself very early and may become serious before the strawberries are picked.

After picking, the disease makes rapid progress and all the leaves may dry up and become tindery as early as July or August. The diseased plants do not winter well and the crop in the following year may be very small.

All varieties are not equally attacked. It appears from observations made in open fields that the common varieties of strawberry plants may be classed in three groups:—(a) very sensitive—"Clyde," "Glen Mary," "Doctor Burrill," "Pokomoke," (b) fairly sensitive:—"Senator Dunlop," "Ruby," "William Belt;" (c) slightly sensitive:—"New Williams," "Portia," "Parson's Beauty," "Enhance," "Vanoise," "Joe."

Examination of the tindery portions of the spots on diseased leaves and petioles reveals the presence of fructifications of a fungus corresponding to *Marsonia Potentillae* (Desm.), Fisher, which may be quickly grown on ordinary media.

A pure culture of this fungus inoculated on the leaves of the strawberry plant soon produced the typical characters of the disease observed in nature.

If strawberry plants are covered, many leaves survive the winter and remain green, the fungus winters on these in a vegatative condition and produces abundant conidia in spring. An ascophorous stage is abundantly developed from April to June on the dried leaves, particularly on those most exposed. This stage could be identified as *Mollisia Earliana* (E. and E.) Sacc. and is developed on the dried leaves of the strawberry plants after *Mars. Potentillae* and often the conidia of the latter are found on the leaf together with fructifications of *M. Earliana*.

The results of numerous cultural experiments and of inoculation have clearly shown that *Mars. Potentillae* and *M. Earliana* are metagenetically interconnected; in all cases in which the ascospores of *M. Earliana* have germinated, a pure culture has been obtained which has produced spores of the *Marsonia* type; strawberry plants inoculated with spores in suspension taken from a pure culture obtained from an ascospore have shown the typical spots of *Marsonia* and, later typical fructifications of *Mars Potentillae*. The control plants remained entirely free from the disease. A complete description is given of the ascosphorous or perfect stage (*M. Earliana*) as well as of the conidian stage (*Mars. Potentillae*).

Although no experiments have been carried out, it may be supposed that the disease may be controlled by the same means as those used in controlling the "leaf spot" disease of strawberry plants (*Mycosphaerella Fragariae* (Schw.) (Lindau).

OTHER ARTICLES ON SCIENCE AND PRACTICE OF AGRICULTURE

On account of lack of space the following articles in the International Review of the Science and Practice of Agriculture can only be referred to. Anyone desiring the articles may obtain them from the Institute Branch, Department of Agriculture, Ottawa.

1139.—Partial Sterilization of the Soil.—RIVIERE, G., and PICHARD, G., in *Comptes rendus hebdomadaires des seances de l'Academie de Sciences*, Vol. 174, No. 7, pp. 493-495. Paris, Feb. 13, 1922.

1142.—The Classification of Soil Moisture.—PARKER, F. W., in *Soil Science*, Vol. XIII, No. 1, pp. 43-54. Bibliography of 22 publications. New Brunswick, N.J., Jan. 1922.

1149.—The Nitrogen Industry in Germany—I. MURAOUR, H., L'azote en Allemagne avant, pendant et après la Guerre, in *Chimie et Industrie*, Vol. VIII, No. 1, pp. 169-175. Paris, July 1922.—II. MATIGNON, C., L'Industrie des matières azotées en Allemagne, *ibidem*, pp. 176-184.

1190.—Food Value of Oats and Tares as Green Forage, Hay or Silage.—I. WOOD, T. B., and WOODMANN, H. E., Digestibility of Oat and Tare Silage, *The Journal of Agricultural Science*, Vol. XI, Part 3, pp. 304-309. London, June 1921.—II. WOODMANN, H. E., Comparative Determinations of the Digestibility and Metabolisable Energy of Green Oats and Tares, Oat and Tare Hay, and Oat and Tare Silage. *Ibidem*, Vol. XII, Part 2, pp. 144-145. April 1922.

1209.—Experiments With Milking Machines. I. CHRISTENSEN, A., Description of the milking machines tested—II. LUND, A.V., Experiments with milking machines—III. THOLSTRUP PEDERSEN, The Content of Bacteria in the machine-milked Milk, 108th *Compte rendu du Laboratoire experimental de l'Academie Royale veterinarie et agricole danoise*, a communication by Baron Rosenkrantz, International Institute of Agriculture, Danish Office.

1211.—Experiments in Electro-Culture.—*Bulletin officiel de la direction de recherches scientifiques et industrielles et des inventions, Year 32*, pp. 360-482. Paris, June, 1922.

1230.—The Production of Sauerkraut.—I. BRUNKOW, O. R., PETERSON, W. H., and FRED, E. B., The Influence of certain factors upon the chemical composition of Sauerkraut, in *The Journal of the American Chemical Society*, Vol. 43, No. 10, pp. 1244-1255, Easton, Pa., Oct. 1921.—II. FRED, E. B., and PETERSON, W. H. (*Ibidem*), The Production of Pink Sauerkraut by Yeasts, in *Journal of Bacteriology*, Vol. 7, No. 2, pp. 257-269. Bibliography of 10 publications. Baltimore, March 1922.

1248.—White Settlement and World Agriculture.—TAYLOR, G., The Institution of Future White Settlement, A World Survey Based on Physiographic Data, in *The Geographical Review*, Vol. XII, No. 3, pp. 375-402. New York, N.Y., July 1922.

1253.—Effect of Meteorological Factors on the Quality and Quantity of Wheat Produced in Argentina.—HESSLING, N. A., in *Monthly Weather Review*, Vol. 50, No. 6, pp. 302-308. Washington, June 1922.

1254.—Effect on the Yield of Wheat of Variations in the Degree of Humidity of the Soil During and After the Critical Period.—AZZI, G., in *Il Coltivatore*, Year 68, No. 28, pp. 1-7. Casale Monferrato, Oct. 1922.

1257.—The Aeration of Soil as an Ecological Factor.—LARSGUWNER, R., in *Meddelanden fran Statens Skogsforsoksanstalt*, Vol. XIX, No. 2, pp. 125-359, bibliography of 24 works. Stockholm, 1922.

1258.—The Effect of Soil Drying Upon Soluble Soil Constituents.—GUSTAFSON, A. P., in *Soil Science*, Vol. XIII, No. 3, pp. 173-213. Bibliography of 106 works. Baltimore, March, 1922.

1267.—Biochemical Methods for Determining the Fertility of Soils.—STOKLASA, J., in *Chemiker-Zeitung*, Vol. 46, No. 91, pp. 681-683. Cothen, Aug. 1, 1922.

1278.—Progress of Nitrogen Fixation After the War. HARKER, Y. A., in *Chemical Industry*, Vol. 41, No. 18, pp. 387-390. London, September 30, 1921.

1290.—Cultivation of Barley in England.—RUSSELL, E. J., in *Journal of the Institute of Brewing*, Vol. 28, No. 9, pp. 697-713. London, September 1922.

1315.—Cherry Growing in Wisconsin, U.S.—ROBERTS, R. H., in *Agricultural Experiment Station of the University of Wisconsin*, Bulletin 344, 30 pp. Madison, June 1922.

1320.—An Investigation Into the Relation Between Height Growth of Trees and Meteorological Conditions.—HILAY, W.E., and CANLIFFE, N., in *Oxford Forestry Memoirs*, No. 1. Oxford, 1922.

1339.—Rearing Young Pigs Without Milk Rations.—SANDBRINK, in *Zeitschrift fur Schweinezucht*, Year XXIX, No. 8, pp. 116-121. Neudamm, May 1, 1922.

1352.—Intensive Chicken Rearing.—PLIMMER, R.H.A., ROSEDALE, J.L., TOPPING, R.B., CEICHTON, A., I. The Vitamin Requirements, Preliminary Experiment.—II. The Effect of "Good" Protein, in *The Biochemical Journal*, Vol. XVI, No. 1, pp. 11-22. London 1922.

1353.—Piscicultural Value of a Stream.—JOLYET, A., in *Revue des Eaux et Forets*, Vol. 60, No. 9, pp. 283-296. Paris, September 1922.

1361.—Value of Animal Products in Relation to Crop Yield Since 1919 in the United States.—*Weather, Crops and Markets*, Vol. II, No. 11, pp. 220-221. Washington, D.C., September 1922.

1371.—The Grape Syrups and Preserve Industry.—BORGHI, M., in *Giornale du Chimica industriale ed applicata*, Vol. 4, No. 9, pp. 396-402. Milan, September, 1922.

1375.—Bitter Milk at a Late Stage of Lactation.—PALMER, L. S., in *Journal of Dairy Science*, Vol. 5, No. 2, pp. 201-211. Baltimore, March 1922.

THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS

The following is a brief indication of the contents of the more important articles in the January-March number of the Institute Bulletin. Persons interested in any of the articles may obtain the original Bulletin on application to the Institute Branch, Department of Agriculture, so long as the supply for distribution is not exhausted.

Agrarian Reform in Eastern Europe.—16 pages. In the various states of Eastern Europe which occupy territories formerly included within the Austrian, Russian, German and Ottoman Empires, there has been a common movement towards the more equal distribution of land. This movement is not collectivist, because the land so distributed is to be held in private ownership.

The article begins with a historical account of the changes in the systems of land tenure in the countries in question. It then deals with the new agrarian laws, most of which were passed in 1919. The laws of Roumania, Poland, and Czechoslovakia are discussed in detail.

In Roumania 12,500,000 acres of arable land have passed from the hands of large owners into those of 1,500,000 of heads of peasant families. When the reform is completely carried through, out of a total of 32,000,000 acres of arable land in Greater Roumania, 29,500,000 acres will have definitely passed into the hands of 4,000,000 peasants, in separate lots varying from 2½ to 12 acres, while 2,500,000 acres will remain in the hands of about 6,000 owners in holdings varying from 250 to 500 acres. It is admitted that for a decade these changes will have the effect of reducing the total production of the country.

The redistribution of the land is proceeding much more slowly in Czechoslovakia and Poland. In the former country a significant result of the new regime will be the nationalization of the forests.

Share Tenancy in Spain.—17 pages. This article deals with the different forms of share tenancy common in Spain. The conditions fixed in the agreements are given in detail, and the effects of the different systems of tenancy on cultivation and production are described.

The Development of Farm Household Management Instruction in Belgium.—13 pages. The system of instruction in farm household management now in force in Belgium has proved to be thoroughly adapted to national requirements. The object of the system is to train the girls of farming families in the duties of their position. The course in the farm household management schools generally lasts two years. The curriculum includes the rudiments of the natural sciences and of the theory of agriculture, market gardening, floriculture, elements of stock breeding, dairying and cheesemaking, domestic economy (cooking, sewing, etc.) child nurture, hygiene, business routine, bookkeeping, and law as applied to every day life. The course includes instruction in theory and practical work.

Travelling farm household management schools have also been established. These schools are set up in rotation, on the application of the communal authorities, agricultural societies, or of private persons. The article describes their working in detail.

The article goes on to describe methods of training those who give the instruction in these schools, and gives an account of the organization of the State Higher Training Institute for Farm Household Management.

The Principal Types of Agricultural Co-operative Society in Italy.—31 pages. Agricultural co-operation has spread very rapidly in Italy during the last twenty years. The following classes of society are discussed in this article: co-operative credit societies; co-operative societies for the purchase of requisites; co-operative societies for production and for the sale of produce; co-operative labour societies; and co-operative landholding societies. The article outlines the characteristics of each group and indicates the development it has attained.

Co-operation in the Argentine Republic.—37 pages. This study presents statistical data for 1920-21 compared with former

years. It describes the rural and urban co-operative societies and indicates the different kinds of societies into which each of the two groups is divided. The article discusses the kind of rural co-operative societies best adapted to Argentine conditions and gives a detailed summary of existing legislation on co-operation. The last sections of the article deal with federations of co-operative societies, and mutual insurance.

Other articles in the January-March number are: The Co-operative Movement in Esthonia; Agricultural Co-operative Credit in France in 1920-21; The Teaching of Co-operation in Germany; The Catholic Agricultural Co-operative Movement in Italy; Agricultural Co-operative Societies in Latvia; Rural Credit Associations in New Zealand; Agricultural Co-operative Credit Societies in Russia; The Financial Guarantee Bank for Agricultural Labourers and Small Holders in Switzerland; The Conversion of Collective Ownership of Land in Algeria into Individual Ownership; Forms of Agricultural Agreement in Cuba; Statistics of The Agrarian Reform in Esthonia; The Work of Colonization in The Italian Colonies; Allotment Gardens in France Since the War.

AGRICULTURAL STATISTICS

THE WORLD'S CEREAL CROPS OF 1923

THE WHEAT REQUIREMENTS AND SUPPLIES FOR THE PRESENT GRAIN YEAR

By T. K. DOHERTY

Around the date a year ago corresponding to the present, (August 23rd) extremely low prices prevailed. Bearish items of crop and trade news were the rule, and there was general discouragement among the Canadian producers who were confronted with a large crop but a demoralized world's market suffering from loudly proclaimed adverse economic conditions and lack of credit in Europe, which were to make imports exceptionally small. It was, however, soon realized that the European crop was 200 million bushels less than in 1921, that Europe's old stocks were low and she was compelled to replenish, that the Southern Hemisphere, from which liberal supplies had come up to that time, was nearing the end of its surpluses, so that the importing world had to depend almost exclusively for several months on the North American shipments. The tide of the market soon changed and a considerably higher range of prices was soon reached and maintained for many months. Last year, while the wheat crop of Europe was deficient, in North America the crops exceeded those of the previous year by 146 millions. This year they are abundant in Europe, but in North America, from the most recent official estimates, they are 86 million bushels less than last year. Is the history of last year's prices going to be repeated for the present season's crops? The situation is much more complicated and confused than a year ago and still is not, from the producers' standpoint, without its strong points, as the accompanying statistics and statements will demonstrate. Only fourteen of the twenty-two European countries have so far issued official reports and these exhibit an increase of 144 million bushels. In the accompanying statistical tables where rough estimates are made for the remaining eight countries, derived from acreage and recently reported conditions, the totals exhibit an increase for Europe of 178 million bushels or within 11 million bushels as much as the record production of 1921. While the world's production on the same basis of official and unofficial estimates shows an increase of 150 million bushels, there is 70 million bushels of a decrease in the five chief exporting countries, even conceding as has been done in the statistical tables, fair increases in the next harvests of South America and Australasia.

Moreover, on the North American continent rust and drought have produced a comparatively large quantity of light and unmerchantable wheat. Evidences of this fact are afforded by recent inspections in Manitoba, Kansas and the Northwestern States. Some interesting facts are furnished by the "Price Current-Grain Reporter" of August 16th, from which it appears that east of the Rockies there is only 13 million bushels over and above actual bread and seed requirements available for export, while the inter-mountain and Pacific Coast States have a surplus of 146 million bushels. Last year the States east of the Rockies had 112 million bushels more than was actually required for home needs, and the far west had 99 million bushels. The greatest reduction in the present year's crop, as compared with last year's is in the States that usually furnish the bulk of the grain that enters into inter-state commerce, and already there is keen competition between the

various mills in all sections of the country for the choice hard winter wheat raised in the southwest and west. It is scarcity of hard winter wheat that perplexes the average miller, as there is a tendency to reduce estimates on account of disappointing threshing returns. This is particularly marked in Kansas where the actual yields are running one or two bushels per acre less than indicated by the Government's conditional figures in July.

The "Price Current-Grain Reporter" goes on to state that, included in the figures of the total surplus east of the Rockies is the Durum wheat, which is not used to any great extent for bread flour in the United States. After eliminating the Durum which is conceded to comprise one-half of the whole exportable surplus, it is doubtful if the entire belt east of the Rockies can spare over 30 million bushels for export, even after cutting down the carry-over to well under last year's holdings. The "Reporter" states that owing to the low price of wheat and high price and scarcity of corn there will probably be a heavier consumption this season than last because of feed and waste and also because some grain will not be threshed. It is, moreover, observed that in the United States and elsewhere the Oriental demand for this Western wheat is active, that the portion of the wheat destined for the European market will arrive as late as January. The bread spring wheat crop in the four northwestern States is heavily short of last year, and northwestern mills will probably be free buyers of strong hard winter wheats in the southwestern States throughout the year, and eastern mills will have to import Canadian hard winter, duty paid, in order to be assured of supplies. It may be incidentally mentioned that Canadian exports to the American mills during the past grain year, notwithstanding the duty, amounted to 17 million bushels.

In a despatch from Washington dated August 20th it was stated that, in line with a movement of the U.S. Department of Agriculture to get U, S. farmers to reduce wheat acreage, the American Farm Bureau Federation is advising a cut of at least 20% in the sowing of winter wheat. A recent survey by the Department indicated farmers were actually reducing acreage this fall about 15%. Assuming the estimate of the Agricultural Department of 39 million acres of wheat to be correct on the basis of 14 bushels per acre, there would be a crop of 549 million bushels next year compared with 568 million this year and 590 million the five-year average.

The world's visible supply as of the 1st of August, compiled from various expert sources and published in detail in the "Chicago Daily Trade Bulletin" of August 16th, amounted to 161 million bushels against 124 million last year, an increase of 37 million, represented in good part by the increased stocks of the United States which were about 73 million bushels, compared with 44 last year, while Canada's were only 14 million bushels compared with 19 million the preceding year.

Canada has had signal success in the disposal of its last wheat crop. Taking the international grain year August 1st to July 31st and allowing a 5 per cent deduction for screenings, waste and unmerchantable wheat also 24,327,000 bushels of a carry-over, Canada had 402,320,000 bushels to dispose of. 279 million bushels of this was exported and, after allowing 92 million bushels for food and seed, there apparently remains on August 1st a surplus of 31,320,000. If it is assumed that as much will be exported in August as in July, that is 16 million bushels, there will remain of the old crop on September 1st only 15 million bushels. On a similar calculation but with no allowance for screenings, waste and unmerchantable wheat, the United States for the same period had a net export of only 199 million bushels with a surplus as of August 1st of about 86 million. It is expedient to recall that for the record crop and grain year 1915-16 the August 1st, 1916, surplus stood for the United States at 153,978,000 bushels, and for Canada at 48,579,000 bushels. During August of that year Canada shipped 23 million, leaving on September 1st 25 million, while in the same time the United States shipped only 15 million.

Speaking of the present season, the crop of India harvested in April last, at first reported at 426 million bushels, has dwindled to an official estimate of 369 million, and the 20 odd million of exports for the last grain year are not likely to be exceeded in the next. The exports of Argentina on December 31st last amounted to 28,736,000 bushels and from that date to August 1st instant to something over 114 million, making a total of about 144 million for the whole grain year. Then, against a surplus of over 40 million bushels on August 1st last year she had only about 20 million bushels on the same date this year. The official report issued on July 3rd was 36,800,000 and exports during July were probably the average of the immediately preceding months, or something over 16 million bushels. Australia's surplus at the beginning of August was officially given as only 8 million bushels. This clean-up of stocks in the Southern Hemisphere so early in the calendar year is probably a record performance. The world's exports have recently dwindled very materially and the floating supply on August 1st was reduced by 10 million bushels as compared with the same date the previous year. Quite apart from the consideration of lessened demand this situation may result from the fact that the exporting countries have very little wheat of merchantable quality from the old crop.

The result of the whole situation briefly described is to leave Canada in an exceptionally advantageous position, the full benefit of which she is very likely to reap. She is in a position to practically control the world's exports for the next five months.

The chief difficulty to surmount in calculating the total world import for the present grain year is the apparent crippling of Germany's purchasing power through adverse exchange, which she is at the present moment so intently engaged upon remedying, also the European unsettlement due to the occupation of the Ruhr, and the pending reparations issue. There is, however, the fact of which Mr. Poincare recently gave a reminder, that England, our best customer, has recently increased her trade and lessened unemployment. These improved conditions must be pretty general, otherwise a satisfactory account cannot be given of the increased exports in general of Canada and the United States with England and the rest of Europe. These increased exports imply increased power to make payment. The very fact that Europe has better crops this season tends further to increase that power and the general standard of living which means still larger imports.

Mr. George Broomhall's estimate of the prospective wheat imports of Europe at 532 million bushels we agree with in the main, although it probably concedes too little to a few of the importing countries, but we differ from his expectation that the imports outside of Europe will be only 100 million bushels which in the last year probably exceeded that amount. China, Japan and the smaller countries in the Orient are less and less able to supply their own needs because of their increasing preference for white bread and the lack of land for the cultivation of wheat, and the exports from the American Pacific Coast this season will probably be exceptionally large. Our detailed statement as follows for European needs may not be far astray:

	Million Bushels
Great Britain	220
Germany	50
France	35
Italy	80
Belgium	38
Denmark	7
Sweden	10
Norway	6
Netherlands	24
Finland	5
Greece	13
Switzerland	16
Austria	13
Czechoslovakia	5
Spain	10
Portugal	6
Total	538

To this is to be added at least 110 million bushels for ex-European takings which are usually only in part recorded in available statistics which would make a total of world imports of about 648 million bushels. In order to meet this demand and allowing for the usual loss of quantity and weight in transit there would have to be recorded exports of about 668 million bushels.

On July 24th Mr. George Broomhall (and other distinguished statisticians, who have been very pessimistic as to the tendency of prices, seem to agree with him) published the following estimate of the prospective available export surpluses of the leading countries:

	Million Bushels
Canada	360
United States	208
Argentina	144
Australia	80
India	56
Total	848

From our accompanying tables of production and trade anyone can readily infer that this statement presents grossly exaggerated expectations. Dealing with these countries only and omitting Roumania and Hungary which shipped 10 million bushels last year the following is a statement of their net shipments during the grain year which closed on August 1st instant.

	Million Bushels
Canada	279
United States	199
India	21
Australia	53
Argentina	144
Total	696

There is no probability that these same five countries can spare the same quantity in the coming year and retain normal surpluses at the close. The following statement appears near the limit of probability:

	Million Bushels
Canada	260
United States	180
Argentina	120
Australia	50
India	20
Total	630
to which add	
The Balkans	20
Russia	15
North Africa	10
Total	675

These exports if realized would supply the demand and make up the reduction

of 10 million bushels in the floating supply on August 1st, 1923, as compared with August 1st, 1922.

Then, assuming the Canadian crop to be as large as last year's, owing to the low quality of a considerable proportion of the Manitoba and southeastern Saskatchewan crop, it is improbable that there will be as large a quantity of exportable grades available as last year. The same observation may, with greater force, be applied to a considerable portion of the U.S. crop. It may be applied to some extent to the crop of our biggest customer, England, whose crop is turning out of disappointing quality for milling purposes and therefore justifies our estimating that her imports will exceed those of last year.

WORLD'S PRODUCTION OF WHEAT

Countries	Area			Production		
	1923	1922	1921	1923	1922	1921
	Acres	Acres	Acres	Bushels	Bushels	Bushels
EUROPE:—						
Great Britain and Ireland	1,900,000	2,073,000	2,076,000	61,000,000	65,249,000	73,795,000
France	13,660,000	13,072,000	13,300,000	290,000,000	243,317,000	323,470,000
Germany	3,200,000 (a)	3,396,000	3,562,000	95,000,000 (a)	71,934,000	107,824,000
Belgium	340,000	300,000	344,000	12,589,000	10,615,000	14,495,000
Netherlands	160,000 (a)	156,000	180,000	6,687,000	5,236,000	8,425,000
Denmark	235,000 (a)	237,000	220,000	11,000,000 (a)	9,249,000	11,145,000
Norway	35,000 (a)	25,000	41,000	900,000 (a)	643,000	972,000
Sweden	360,000 (a)	356,000	360,000	12,000,000 (a)	9,381,000	12,577,000
Finland	31,000	22,000	20,000	420,000	296,000	280,000
Spain	10,379,000	10,309,000	10,386,000	142,070,000	125,470,300	145,151,000
Portugal	1,100,000 (a)	1,123,000	1,033,000	9,000,000 (a)	9,782,000	9,418,000
Italy	11,614,000	11,489,000	11,779,000	199,151,000	161,643,000	192,838,000
Switzerland	157,000	152,000	173,000	5,034,000	3,571,000	5,284,000
Luxemburg	25,000	23,000	45,000	500,000 (a)	173,000	661,000
Poland	2,538,000	2,574,000	2,093,000	53,389,000	42,451,000	37,410,000
Czechoslovakia	1,483,000	1,527,000	1,556,000	37,000,000 (a)	33,621,000	38,382,000
Austria	450,000 (a)	460,000	379,000	7,500,000 (a)	7,422,000	6,530,000
Hungary	3,411,000	2,855,000	2,888,000	62,678,000	54,729,000	52,716,000
Jugoslavia	3,606,000	3,723,000	3,824,000	50,000,000 (a)	42,248,000	51,810,000
Roumania	6,257,000	6,548,000	6,149,000	106,557,000	92,008,000	78,564,000
Bulgaria	2,259,000	2,226,000	2,361,000	38,783,000	37,705,000	42,510,000
Greece	1,071,000	890,000	988,000	13,356,000	9,553,000	11,170,000
Total Europe	64,271,000	63,536,000	63,757,000	1,214,614,000	1,036,296,000	1,225,427,000
NORTH AMERICA:—						
Canada	22,169,000	22,423,000	23,261,000	382,514,000	399,786,000	300,858,000
United States	58,253,000	61,230,000	63,696,000	793,000,000	862,000,000	814,905,000
Total North America	80,422,000	83,653,000	86,957,000	1,175,514,000	1,261,786,000	1,115,763,000
ASIA:—						
India	30,492,000	28,485,000	25,783,000	369,274,000	367,135,000	250,356,000
Japan	1,199,000	1,229,000	1,264,000	26,485,000	27,617,000	26,921,000
Total Asia	31,691,000	29,714,000	27,047,000	395,759,000	394,752,000	27 ,277,000
AFRICA:—						
Algeria	2,795,000	3,103,000	2,816,000	38,383,000	18,233,000	33,764,000
Egypt	1,500,000 (a)	1,518,000	1,458,000	40,304,000	36,648,000	37,011,000
Morocco	2,318,000	2,068,000	1,790,000	23,549,000	12,894,000	23,220,000
Tunis	1,112,000	882,000	1,500,000	9,406,000	3,674,000	10,623,000
South Africa	850,000 (a)	839,000	867,000	7,000,000 (a)	6,696,000	8,689,000
Total Africa	8,575,000	8,410,000	8,431,000	118,642,000	78,145,000	113,307,000
SOUTH AMERICA:—						
Argentina	16,500,000 (a)	15,940,000	13,927,000	200,000,000 (a)	189,047,000	180,642,000
Chili	1,300,000 (a)	1,285,000	1,296,000	23,000,000 (a)	23,815,000	22,779,000
Uruguay	500,000 (a)	494,000	812,000	8,000,000 (a)	3,674,000	9,944,000
Total South America	18,300,000	17,719,000	16,035,000	231,000,000	216,536,000	212,765,000
AUSTRALASIA:—						
Australia	10,000,000 (a)	9,960,000	9,719,000	110,000,000 (a)	107,263,000	132,285,000
New Zealand	300,000 (a)	283,000	353,000	8,000,000 (a)	8,500,000	10,565,000
Total Australasia	10,300,000	10,243,000	10,072,000	118,000,000	115,763,000	142,850,000
WORLD'S TOTAL	213,559,000	213,275,000	212,299,000	3,253,529,000	3,103,278,000	3,087,389,000

(a) Estimates based on official reports of crop conditions, and on unofficial reports.

MONTHLY EXPORTS OF WHEAT AND FLOUR
1922–23

Months	Canada	United States	India	Australia	Argentina	Total
	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels
1922-23						
August	14,247,000	38,966,000	10,000	2,517,000	8,719,000	64,459,000
September	12,372,000	31,839,000	8,000	1,960,000	4,800,000	50,934,000
October	41,442,000	25,077,000	34,000	1,254,000	5,202,000	73,009,000
November	60,781,000	17,579,000	1,900,000	1,081,000	5,831,000	87,172,000
December	47,251,000	16,428,000	2,298,000	1,919,000	5,836,000	73,732,000
January	14,354,000	12,519,000	2,618,000	8,818,000	12,583,000	50,892,000
February	10,637,000	12,198,000	1,272,000	5,855,000	18,494,000	48,456,000
March	12,108,000	10,725,000	1,079,000	8,787,000	18,042,000	50,741,000
April	8,889,000	10,195,000	2,327,000	6,484,000	17,265,000	45,160,000
May	14,833,000	14,396,000	3,533,000	5,047,000	15,860,000	53,699,000
June	26,300,000	12,881,000	3,000,000 (a)	5,000,000 (a)	16,000,000 (a)	63,181,000
July	16,153,000	12,000,000 (a)	3,000,000 (a)	5,000,000 (a)	16,000,000 (a)	52,153,000
Totals	279,367,000	214,803,000 (b)	21,081,000	53,712,000	144,632,000	713,588,000 (b)

(a) Estimated.
(b) From this must be deducted 17,000,000 bushels the United States imports from Canada.

RYE, BARLEY, OATS AND CORN (1)

Official estimates of the 1923 production of cereals other than wheat have been issued by about only half of the producing countries of the northern hemisphere, but since most of the more important countries have reported a good idea of the outlook for the present grain year may be deducted.

Rye.—Estimates for 12 countries have been published showing a total of 427,350,000 bushels against 426,639,000 last year. All the European countries reported show increases, that in Poland being 22,000,000 bushels, Canada shows a decrease of 3,500,000 bushels, and the United States one of 30,000,000 bushels.

During the grain year 1922-23 Canada exported over 9,000,000 bushels of rye and the United States 51,000,000. Canada's exports went chiefly to Great Britain, Germany and the Netherlands, while the United States exported chiefly to Germany, Netherlands and Norway, in the order named.

Barley.—Fifteen countries have a total production of 666,000,000 bushels against 592,000,000 last year. In Europe there is an increase in every country so far reported. Canada shows a decrease of 4,000,000 bushels, and the United States an increase of 16,000,000. There is also a large increase in Algeria.

During the twelve months ended July, North America and the Danubian countries (chiefly Roumania) have together supplied about 85 per cent of the world's shipments of barley, the former accounting for just under 40 per cent., and the latter for about 45 per cent. Canada exported 12,000,000 bushels and the United States 18,000,000. Canada's exports are chiefly to Great Britain, with a fair amount to Belgium and the Netherlands. The United States exported mostly to Great Britain, Belgium and Denmark.

Oats.—Reports have been received from 13 countries giving a total of 2,095,000,000 bushels against 1,978,000,000 in 1922. Most of the countries of Europe show increases. Canada has a decrease of 43,000,000 bushels, and the United States an increase of 115,000,000 bushels.

As in the case of barley a large proportion of the world's shipments of oats are from Canada and the United States, these countries having supplied about 45 per cent of the total during the 12 months ended July 1923. Canada exported in that time 24,000,000 bushels chiefly to Great Britain, Belgium and the Netherlands, and the United States exported 18,600,000 bushels chiefly to Great Britain, Belgium, Italy and France.

Corn.—The production of corn in the United States is estimated as 2,982,000,000 bushels against 2,891,000,000 last year, an increase of 90,000,000 bushels. The preliminary estimate of the crop of Canada is 15,351,000 bushels against 13,798,000 last year. In 1922 Canada imported 10,000,000 bushels of corn from the United States.

(1) See tables on pages 489, 490.

RYE

Countries	Area			Production		
	1923	1922	Average 1917 to 1921	1923	1922	Average 1917 to 1921
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Belgium	557,000	531,000	535,000	19,537,000	18,284,000	17,982,000
Bulgaria	457,000	442,000	465,000	8,480,000	7,453,000	6,186,000
Spain	1,755,000	1,757,000	1,803,000	30,310,000	26,252,000	26,779,000
Jugoslavia	395,000	499,000	475,000	.....	4,443,000	5,953,000
Finland	583,000	578,000	596,000	8,545,000	7,775,000	9,521,000
France	2,172,000	2,196,000	2,128,000	.....	38,412,000	35,700,000
Greece	217,000	198,000	222,000	2,662,000	2,362,000	3,151,000
Hungary	1,650,000	1,340,000	1,408,000	27,443,000	25,148,000	21,856,000
Italy	321,000	320,000	316,000	6,693,000	5,563,000	5,675,000
Latvia	618,000	584,000	561,000	10,236,000	6,845,000	9,806,000
Lithuania	1,392,000	1,369,000	1,196,000	.....	59,963,000	18,336,000
Poland	11,568,000	11,225,000	9,619,000	219,250,000	197,394,000	175,860,000
Roumania	456,000	659,000	793,000	.....	9,206,000	9,263,000
Switzerland	47,000	55,000	51,000	1,575,000	1,693,000	1,576,000
Czecho slovakia	2,127,000	2,174,000	2,202,000	.....	51,098,000	43,338,000
Canada	2,018,000	2,105,000	803,000	27,819,000	32,373,000	11,066,000
United States	5,234,000	6,210,000	5,465,000	64,800,000	95,497,000	70,426,000
Totals for countries having estimates for 1923	31,567,000	32,242,000	28,638,000	427,350,000	426,639,000	359,884,000

BARLEY

Countries	Area			Production		
	1923	1922	Average 1917 to 1921	1923	1922	Average 1917 to 1921
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Belgium	93,000	80,000	88,000	4,223,000	3,438,000	4,306,000
Bulgaria	531,000	534,000	539,000	12,282,000	11,941,000	8,970,000
Spain	4,151,000	4,082,000	4,225,000	91,731,000	77,534,000	86,010,000
Jugoslavia	488,000	941,000	918,000	.....	10,523,000	13,289,000
Finland	277,000	297,000	290,000	4,644,000	4,557,000	4,810,000
France	1,592,000	1,713,000	1,607,000	.....	40,909,000	34,329,000
Hungary	1,176,000	1,130,000	1,225,000	23,502,000	22,170,000	21,540,000
Italy	568,000	576,000	530,000	10,105,000	8,254,000	9,022,000
Lithuania	419,000	417,000	395,000	.....	10,725,000	6,097,000
Poland	2,966,000	2,825,000	2,609,000	66,222,000	59,559,000	58,151,000
Roumania	.....	4,269,000	3,669,000	.....	94,780,000	56,430,000
Switzerland	15,000	16,000	19,000	551,000	482,000	631,000
Czechoslovakia	1,686,000	1,668,000	1,662,000	.....	46,352,000	42,355,000
Canada	2,563,000	2,600,000	2,708,000	67,545,000	71,865,000	62,350,000
United States	7,980,000	7,390,000	8,032,000	202,000,000	186,110,000	192,000,000
Japan	2,516,000	2,746,000	2,912,000	81,369,000	87,138,000	92,073,000
Algeria	2,827,000	2,868,000	2,717,000	46,316,000	18,805,000	34,886,000
Egypt	.....	375,000	385,000	11,374,000	11,306,000	11,189,000
Morocco	2,867,000	2,548,000	2,246,000	32,734,000	27,230,000	32,805,000
Tunis	988,000	603,000	1,173,000	11,482,000	1,837,000	8,102,000
Totals for countries with estimates for 1923	33,703,000	33,034,000	33,895,000	666,080,000	592,226,000	626,845,000

OATS

Countries	Area			Production		
	1923	1922	Average 1917 to 1921	1923	1922	Average 1917 to 1921
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Belgium	652,000	717,000	583,000	.....	33,667,000	30,259,000
Bulgaria	344,000	352,000	338,000	9,461,000	8,606,000	6,429,000
Spain	1,514,000	1,514,000	1,533,000	34,813,000	29,378,000	31,970,000
Finland	1,038,000	988,000	1,045,000	24,435,000	26,540,000	23,132,000
France	8,540,000	8,492,000	7,999,000	.....	271,311,000	224,531,000
Greece	180,000	.....	186,000	5,613,000	.....	3,811,000
Hungary	856,000	818,000	844,000	22,930,000	21,227,000	20,834,000
Italy	1,211,000	1,214,000	1,184,000	34,366,000	28,673,000	33,701,000
Lithuania	773,000	769,000	704,000	.....	27,240,000	14,962,000
Poland	6,225,000	5,879,000	5,050,000	179,386,000	162,469,000	147,025,000
Switzerland	49,000	51,000	64,000	2,853,000	2,321,000	3,448,000
Czechoslovakia	2,063,000	2,017,000	1,967,000	.....	67,344,000	62,938,000
Canada	15,519,000	14,541,000	15,171,000	448,659,000	491,239,000	436,128,000
United States	40,768,000	40,693,000	42,776,000	1,316,000,000	1,201,000,000	1,378,000,000
Algeria	596,000	583,000	586,000	12,323,000	5,243,000	12,818,000
Morocco	32,000	28,000	21,000	1,083,000	169,000	368,000
Tunis	124,000	112,000	152,000	3,112,000	746,000	3,197,000
Totals for countries with estimates for 1923	80,484,000	78,768,000	80,203,000	2,095,034,000	1,977,611,000	2,100,861,000

CORN

Countries	Area			Production		
	1923	1922	Average 1917 to 1921	1923	1922	Average 1917 to 1921
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Bulgaria	1,199,000	1,313,000	1,415,000	.....	.....	.....
France	781,000	790,000	796,000	.....	.....	.....
Italy	3,707,000	3,811,000	3,821,000	.....	.....	.....
Switzerland	4,000	4,000	6,000	157,000	185,000	284,000
Czechoslovakia	403,000	392,000	377,000	.....	.....	.....
Canada	307,000	318,000	266,000	15,351,000	13,798,000	13,631,000
United States	103,112,000	102,428,000	102,882,900	2,982,000,000	2,891,000,000	2,931,000,000
Algeria	12,000	19,000	19,000	276,000	276,000	268,000
Totals	109,525,000	109,075,000	109,584,000	2,997,784,000	2,905,259,000	2,945,183,000

POTATOES

Countries	Area			Production		
	1923	1922	Average 1917 to 1921	1923	1922	Average 1917 to 1921
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Belgium	374,000	445,000	391,000	.....	.....	.....
Bulgaria	24,000	20,000	20,000	.....	.....	.....
Finland	168,000	185,000	202,000	17,254,000	16,009,000	17,775,000
France	3,560,000	3,619,000	3,485,000	.....	.....	.....
Italy	890,000	861,000	822,000	.....	.....	.....
Lithuania	328,000	326,000	304,000	.....	.....	.....
Poland	5,642,000	5,409,000	4,920,000	.....	.....	.....
Czechoslovakia	1,574,000	1,607,000	1,534,000	.....	.....	.....
Canada	656,000	684,000	740,000	93,751,000	92,908,000	110,200,000
United States	3,892,000	4,331,000	3,906,000	380,000,000	451,000,000	388,000,000
Algeria	46,000	42,000	41,000	2,205,000	2,146,000	1,317,000
Totals	17,154,000	17,529,000	16,365,000	493,210,000	562,063,000	517,292,000

FOREIGN CROP CONDITIONS

(August 20, 1923)

France.—Towards the end of July harvesting was in full swing, and favoured by warm sunny weather. Wheat is threshing out well, the yields exceeding those of last year by more than 15 per cent. Private forecasts of the wheat production vary from 275 to 308 million bushels. Practically all authorities are agreed that little foreign wheat will be required in 1923-24 outside the usual quantities of strong wheats.

Germany.—Warm, sunny weather prevailed in the latter part of July and crops were ripening rapidly.

Austria.—Harvesting was progressing under favourable conditions, and winter cereals were expected to yield exceptionally well.

Jugoslavia.—Harvesting was proceeding under excellent weather conditions. Wheat yields are very good and a fair surplus for export is expected.

Denmark.—Recent weather was favourable and a good crop is expected.

Russia.—The *Ost Express* in a despatch from Moscow dated July 26th, gives the following information. The Central Statistical Bureau of the Soviet Federation describes the harvest prospects as almost satisfactory and estimates the crops as follows, in tons: Important grain crops, 39,400,000; other kinds of grain, 3,770,000 potatoes, 9,858,000. The foregoing items make a total of about 53 million tons, compared with 36 millions in 1922, 34,500,000 in 1921, 41,900,000 in 1920, and 66,000,000 in 1913. The surplus for the current year is estimated at 8,200,000 tons. The surplus mentioned is large, and even if we reduce it by one-half to allow for exaggeration, difficulties of transport, the inclusion of oil-seeds and oilcakes, etc., yet even then there is indicated a substantial quantity of grain, totalling nearly 20,000,000 quarters. We need hardly say that all kinds of grain are included in the official estimate, and at present we do not change our opinion that wheat shipments are likely to be small.

The following statement gives some idea of the reverse side of the glowing picture which the Soviets are so fond of painting:—In conversation with a number of the All-Ukrainian Grain Traders, Comrade Kuznetzov remarked that the hopes expressed at the conference of grain traders regarding grain exports were undoubtedly exaggerated. He said that in the end exports will depend upon the development of the trade inside the country. With the opening of the new season considerable technical difficulties connected with adequate receiving points and inadequate transport organization would have to be overcome. The problem for the moment, said Comrade Kuznetzov, was to find a market for the peasants' produce in order that they could acquire needed machinery and fulfil their tax obligations.

North Africa.—Threshing has made good progress. In the west and centre of Algeria good yields are confirmed, but in the east and in parts of Tunis results are less satisfactory. In Morocco the hard wheat crop has yielded well.

India.—The monsoon is vigorous and has given further good rains in all provinces except Sind.

Argentina.—Cool, rainy weather prevailed in the last week of July. All crops promise well. There are further reports of a large acreage sown to wheat.

Australia.—Further good rains are reported and prospects for the wheat crop are good.

PRICES AND OCEAN FREIGHT RATES REDUCED TO CENTS

Products, Markets and Descriptions	6 July 1923	1 June 1923	7 July 1922	Aver. 1913
WHEAT				
(cents per 60 lbs.)				
Canada:				
Winnipeg: No. 1 Manitoba	110	108	135	88
United States:				
Chicago: No. 2 Winter	104½	111½	116¼	90½
Minneapolis: No. 1 North	112	115	137	87⅝
New York: No. 2 Winter	122	130	130¾	97¼
India:				
Karachi: Karachi white	108	110	129	91
Argentina:				
Buenos Aires: Barletta	110	113	126	100
Germany:				
Berlin: Home grown	131	45	132	128
Belgium:				
Antwerp: Home grown	148	137	157	104
France:				
Paris: Home grown	156	167	181	146
Great Britain:				
London: English	138	125	151	104
Liv. and Lond.: No. 1 Man	129	135	159	110
Liv. and Lond.: No. 2 Win	119	134	136	109
Liv. and Lond.: Pacific	129	139	146	111
Liv. and Lond.: Plate	126	134	143	108
Liv. and Lond.: Australian	134	145	147	117
Liv. and Lond.: C. W. Kar	129	139	n.q.	110
Italy:				
Milan: Home grown soft	130	142	150	148
Netherlands:				
Rotterdam: Home grown	n.q.	149	115	
RYE				
(cents per 56 lbs.)				
United States:				
Minneapolis: No. 2	62	64	81	56⅝
Germany:				
Berlin: Home grown	87	35	93	101
Belgium:				
Antwerp: Home grown	85	94	132	80
France:				
Paris: Home grown	n.q.	91	108	97
Netherlands:				
Rotterdam: Home grown	n.q.	122	86	

Ocean Rates of Freight, and Voyages	6 July 1923	1 June 1923	7 July 1922	Aver. 1913
OCEAN RATES OF FREIGHT (WHEAT AND MAIZE)				
(cents per 100 lbs.)				
Rumania:				
Danube to U.K.	16	19	18	11
Danube to Genoa	15	18	16	10
Canada:				
Canada to U.K.	14	14	15	14
United States:				
New York to Liverpool	7	7	9	10
North Range to U.K. Cont	13	13	14	13
North. Range to Genoa	18	17	18	20
North Pacific Ports to U.K.	38	39	37	43
Argentina:				
Plate Down River-U.K.	20	26	20	18
Plate Up River-U.K.	22	28	22	20
Imdia:				
Karachi to U.K.	28	27	17	20
Rangoon to U.K.	n.	31	22	29
Australia:				
Australia to U.K.	33	35	38	34
COTTON FREIGHTS				
(cents per 100 lbs.)				
United States:				
New York to Liverpool	20	20	25	30
New Orl. to Liverpool	n.q.	n.q.	50	43

INDEX NUMBERS OF THE PRICE OF WHEAT

Dates	WHEAT									
	EXPORTING MARKETS				IMPORTING MARKETS					
	Canada WINNIPEG — No. 1 Manitoba	*United States* CHICAGO — No. 2 Winter	*India* KARACHI — Karachi white	*Argentina* BUEN. AIRES — Barletta	*Germany* BERLIN — Home grown	*Belgium* ANTWERP — Home grown (Märkischer)	*France* PARIS — Home grown	*Great Britain* LONDON — Home grown	*Italy* MILAN — Home grown soft	*Netherlands* ROTTERDAM — Home grown
Average 1913..	100	100	100	100	100	100	100	100	100	100
11 July 1913...	110·8	98·3	100·3	102·9	102	107·9	103·7	102·1	103·2	109·8
14 July 1922...	154·8	130·2	162·0	152·0	10,524	(1) 348·5	296·2	157·2	443·1	134·2
4 May 1923...	135·4	134·6	137·5	140·5	747,331	434·3	334·8	134·4	407·5	122·3
11 May 1923...	132·7	132·7	133·0	137·6	762·583	429·3	340·2	132·3	407·5	120·4
18 May 1923...	133·2	134·6	132·2	137·6	874,428	429·3	337·5	127·1	400·4	122·1
25 May 1923...	134·7	135·2	133·0	137·6	981,190	429·3	347·4	126·0	400·4	.....
1 June 1923...	126·1	123·5	127·3	138·2	1,296,390	459·6	340·2	126·0	395·0	n.q.
8 June 1923...	131·4	124·1	128·1	137·6	1,382,816	459·6	337·5	135·4	393·2	n.q.
15 June 1923...	135·2	126·0	128·9	137·0	1,814,947	464·6	344·7	136·5	389·7	143·7
22 June 1923...	133·2	118·6	127·3	136·4	2,440,264	535·4	344·2	136·5	393·2	154·5
29 June 1923...	126·6	115·2	124·8	134·7	3,126,589	555·6	341·1	137·5	393·2	154·5
6 July 1923...	127·7	115·5	125·6	134·1	4,295,882	555·6	350·1	141·7	393·2	.....
13 July 1923...	122·2	112·6	121·5	132·9	.....	555·6	349·6	141·7	359·4	.....

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Deputy Minister.....J. H. Grisdale, B.Agr., D.A.Sc.

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Functions—To administer the Central Experimental Farm at Ottawa, twenty-one branch farms, eight sub-stations, eighty-six illustration stations, and two tobacco stations. The divisions of work are: Administrative, Chemistry, Horticulture, Cereals, Poultry, Animal Husbandry, Forage Plants, Bee, Tobacco, Botany, Field Husbandry, Flax, Illustration Stations, and Extension and Publicity.

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Functions—To administer enactments for the protection of live stock from contagious diseases, and to inspect meats, meat products and canned foods; to conduct research work.

Live Stock Branch.....Commissioner, H. S. Arkell, M.A., B.S.A.

Functions—To develop the live stock industry through the use of superior stock; to improve marketing facilities; to administer The Live Stock and Live Stock Products Act.

Dairy and Cold Storage Branch.....Commissioner, J. A. Ruddick.

Functions—To develop the dairy industry; to inspect public cold storage warehouses; to carry on shipping experiments; to administer Dairy enactments.

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Functions—To encourage the production and use of pure seed; to test and inspect seed; to inspect feed manufacturing plants; to inspect Fertilizers; to supply seed in case of shortage.

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Functions—To investigate injurious insects and methods of control; to enforce the Destructive Insect and Pest Act.

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Functions—To represent Canada at the Internation Institute of Agriculture at Rome; to publish world agricultural information and statistics; to maintain the departmental library.

Agricultural Instruction Act Branch..Commissioner, (Acting), J. H. Grisdale, B. Agr., D.A.Sc.

Functions—To administer the Agricultural Instructional Act, and to report upon the work carried on by the provinces under its provisions.

Publications Branch.....Director of Publicity, J. B. Spencer, B.S.A.

Functions—To publish "The Agriculture Gazette;" to distribute departmental publications; to prepare and issue other publicity matter.

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